Electrical World

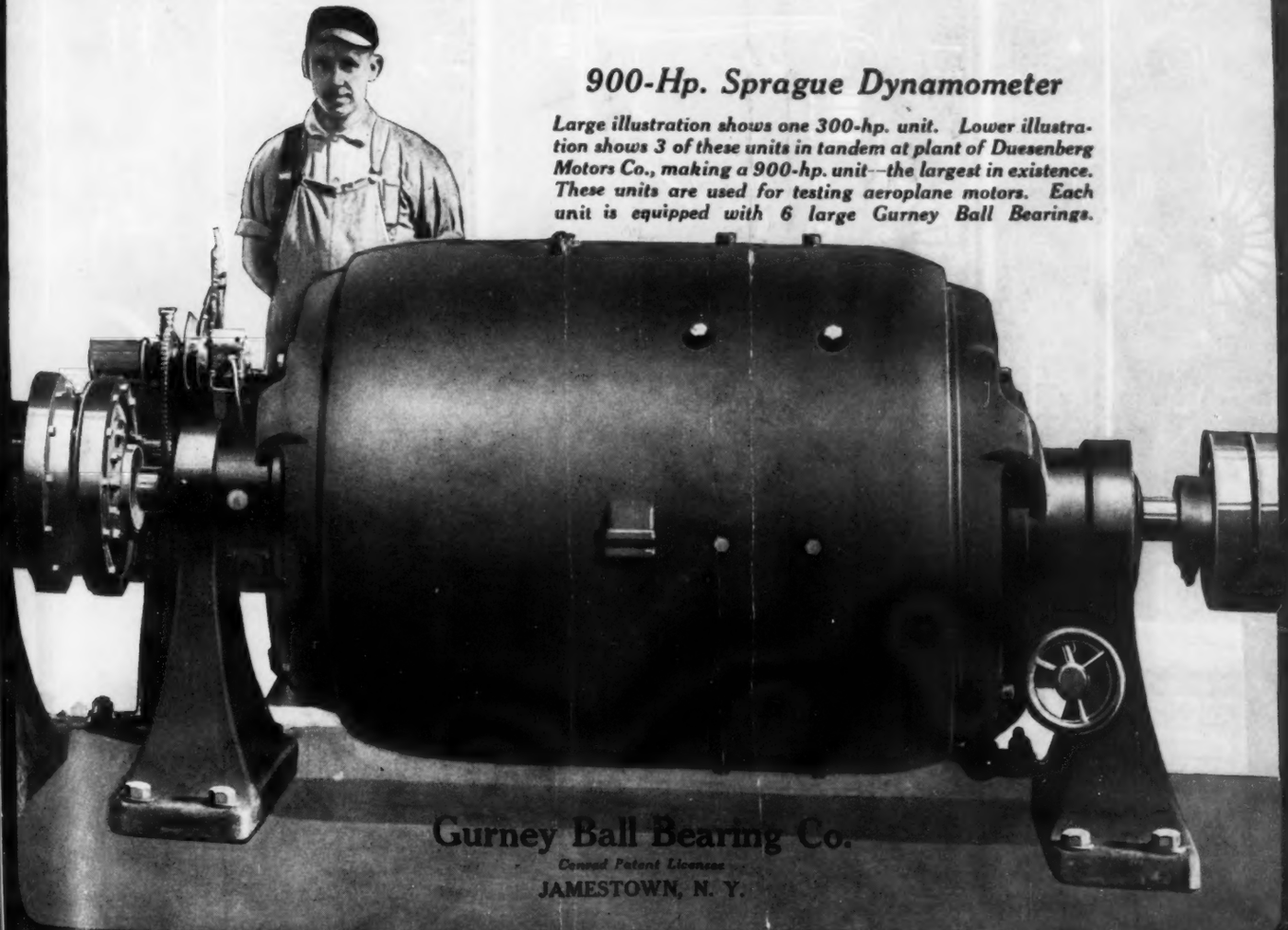
McGraw-Hill Company, Inc. New York, November 23, 1918 15c a copy

GENERAL LIBRARY
NOV 25 1918
UNIV. OF MICH.
Engineering Library

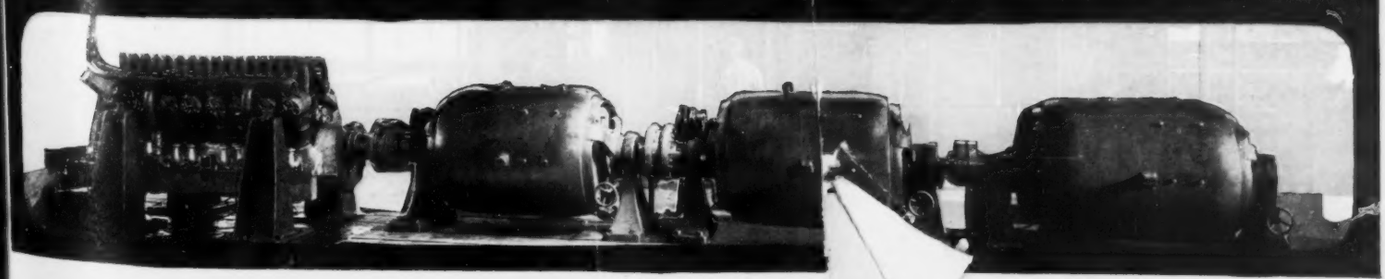
GURNEY EQUIPPED

900-Hp. Sprague Dynamometer

Large illustration shows one 300-hp. unit. Lower illustration shows 3 of these units in tandem at plant of Duesenberg Motors Co., making a 900-hp. unit—the largest in existence. These units are used for testing aeroplane motors. Each unit is equipped with 6 large Gurney Ball Bearings.



Gurney Ball Bearing Co.
Canned Patent Licensee
JAMESTOWN, N. Y.



Weston

Electrical Indicating Instruments

are unqualifiedly superior to any other instruments designed for the same service.

A. C. or D. C., Switchboard or Portable Instruments for every field of Indicating Electrical Measurement. In writing for catalogs and bulletins please specify the field that interests you.

Weston Electrical Instrument Co.

13 Weston Ave., Newark, N. J.

23 Branch Offices in the Larger Cities

Vol. 72, No. 21 New York, November 23, 1918 *Pages 969–1016*

Electrical World

F. M. FEIKER, *Editorial Director* W. H. ONKEN, JR., *Editor*

Member Audit Bureau of Circulations, Member Associated Business Papers, Inc.

Contents

Editorials 969

Connected Load in War and Peace 972
Government Analysis of Business of the Southern California Edison Company Shows that the Industries Supplied in War Time Will Continue to Require Power for Production.

Boiler-Setting Radiation and Air Leakage 974
By E. S. Hight.
Results of Experiments to Determine Best Method of Covering Boiler Settings to Bring About a Reduction in Radiation and Escape of Air—Type of Covering Which Saves $1,000 per 500-Hp. Battery per Year.

Reinforced Concrete Saves Steel in Power Plant 975
Example of the Extent to Which Steel Can Be Replaced if Unavailable—Expediency and Not Economy the Important Factor.

Prorating Line Loss 976
How a Company May Be Equitably Charged for Line Loss When It Is Connected to Line Already Serving Another.

Concrete Brick for High-Tension Cells 977
By E. B. Meyer.
Compartments Made with This Material Have the Advantage that They May Be Put in Service Immediately—They Are Also Quicker and Less Expensive to Construct than Those Built of Other Materials.

Keeping Operating Records 979
By Charles C. Raitt.
Basic Requirements of Records—What Records Are Essential—How Accuracy May Be Maintained—Station Records, Line Records, Construction Records and Their Proper Checking.

For and Against Synchronous Motors 982
By Will Brown.
Four Objections That Have Frequently Been Made to Using Synchronous Motors, with a Discussion Showing How Conditions Have Changed—Synchronous Motors and Unity Power Factor.

Station and Operating Practice 985

Central Station Service 987

Technical Theory and Practice 989

News of the Industry 992

Commission Rulings 1001

Associations and Societies 1001

Current News Notes 1002

Recent Court Decisions 1002

Men of the Industry 1003

Trade and Market Conditions 1004

Current Prices of Electrical Supplies 1008

New Apparatus and Appliances 1010

Trade Notes 1012

Trade Publications 1013

New Incorporations 1013

Construction News 1014

Record of Electrical Patents 1016

Advertising Indexes—Alphabetical, 121; Classified, 117-119; Searchlight Section, 38-62

JAMES H. McGRAW, *President* ARTHUR J. BALDWIN, *Vice-President* E. J. MEHREN, *Vice-President* EDWARD CALDWELL, *Treasurer* JAMES H. McGRAW, JR., *Secretary*

McGRAW-HILL COMPANY, Inc., 10th Avenue at 36th St., NEW YORK

WASHINGTON, 1410 H St., N. W.
CHICAGO, 1570 Old Colony Building
CLEVELAND, Leader-News Building
PHILADELPHIA, Real Estate Trust Building
SALT LAKE CITY, 1101 Newhouse Building
SAN FRANCISCO, Rialto Building
LONDON, 6 Bouverie Street, London, E.C., 4

CABLE ADDRESS, "Machinist"

Publishers also of
Electrical Merchandising
Power
Electric Railway Journal
American Machinist
Engineering News-Record
Chemical and Metallurgical Engineering
Engineering and Mining Journal
Coal Age

United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines, $3 per year; Canada, $4.50; elsewhere, $6. Single copy, 15c.

No back volumes for more than one year and no back copies for more than three months.

Change of Address—When change of address is ordered the new and the old address must be given. Notice must be received at least ten days before the change takes place.

Copyright, 1918, McGraw-Hill Company, Inc. Published weekly. Entered as second-class matter, Jan. 20, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Circulation of this issue 18,000 copies

2032

Coal Saving Suggestions

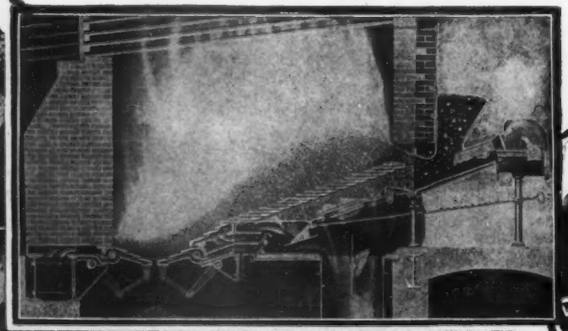
Hand-fired plants are not the only ones in which coal is wasted.

Leaky boiler settings, bare steam pipes, leaky blow-off valves, scaly boiler tubes, improper air distribution, etc., etc., cause losses which the best stoker in the world cannot stop. The good stoker simply makes up this loss with less effort.

Leaflet 2032, "Coal Saving Suggestions", tells you just where the *unexpected* leaks occur—and suggests a remedy.

While the supply lasts, a copy will be mailed to any one in a position to make practical use of the publication.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



W
WESTINGHOUSE ELECTRIC

Westinghouse

Electrical World

The consolidation of ELECTRICAL WORLD, ELECTRICAL ENGINEER *and* AMERICAN ELECTRICIAN

Volume 72 New York, Saturday, November 23, 1918 *Number* 21

Hold Fast to the Good

THE war just ended has brought with it many changes in the electrical industry, some for its betterment and some not. Manufacturers know to what extent standardization of design and curtailment of styles has worked out to their advantage, and not theirs only but that of the jobbers, the contractors and the ultimate users as well. These changes have meant lower costs all around, and it would be a pity to depart from them in peace times.

Public utilities, because of the higher costs of labor and material, have learned how to economize, how to generate electricity more cheaply, and, best of all, have experienced in some degree the benefits of interconnection. If now they will employ the scheme of interconnection for all it is worth, still greater economies may be effected. There are greater possibilities in interconnection than the mere exchange of a few thousand kilowatts. Until use is made of the idle investment in various companies to the benefit of all the highest economies will not be realized. The greatest kilowatt-hour output per dollar of investment should be the goal, and this will not be reached until the generating plants of interconnected systems are pooled so as to permit of unified operation. Such an arrangement is working out well in Pennsylvania, where a superstation has been located at the mines, and has been applied to some extent in California, where the interconnected hydroelectric systems terminating in San Francisco are under the direction of a single system operator. Economies which have been forced on small stations by necessity should not be forgotten with the coming of peace. If the industry is to go forward and fulfill its destiny, every branch must strive for greater and greater economies. The war has brought about many of these, and we should hold fast to all of them.

Labor and capital both need guidance in the days immediately before us. Violence, discord and confusion are bound to arise if reconstruction problems are not settled aright. Social readjustments involve human nature and human motives, and these cannot be ignored.

Concrete Brick

PEOPLE who are building switchboards of the design now common find themselves facing problems that pertain quite as much to architecture as to electrical construction. A brief article by E. B. Meyer in this issue points out the usefulness of concrete brick for much of the construction of the fireproof compartments necessary for switch and other apparatus. These have been built of smooth brick or monolithic concrete. This brick is not just now altogether easy to get, and the present cost of lumber puts the somewhat intricate forms necessary for molding into the class of luxuries. The material found most desirable in Mr. Meyer's practice has been concrete brick of standard brick size, made in a very simple machine out of one part of cement mixed with one and one-half parts of sand and two parts of gravel. Three men can turn, mix and turn out about 2000 bricks a day, which are cured in about twelve hours in a steam bath. It is found by experience that a given structure can be built more quickly and cheaply at present from such concrete brick than from the molded concrete, making a strong and fireproof structure at a cost materially below that of ordinary brickwork. Of course, concrete brick has been largely used for general purposes, but few people seem to have appreciated the ease with which such bricks of standard size can be made and laid into almost any kind of construction.

Fifty-five million tons of coal can be saved annually in Great Britain by thorough and extended use of electricity in that country, not to mention increased production and earnings. We use more coal than England, and a saving of 100,000,000 *tons of coal is not beyond possibility in this country. Electricity can do it.*

A Study of Boiler Settings

IN THESE days, when the efficiency of prime movers and generators has been pushed well toward the topmost limit, it is to the boiler and furnace that one must look for improved economy of power production. Cold air coming in through loose boiler settings and heat wasted from this same setting by radiation are not inconsiderable factors in the final result. Many methods of keeping the setting tight and lessening heat transference from it have been tried out, and E. S. Hight's discussion of this matter is a material addition to the sum total of useful experience. The whole matter came seriously before the engineering staff of the Illinois Traction System, operating twenty-two power plants. After considering various methods of incasing the boiler settings, the one finally settled upon was of exceedingly simple character.

Wire loops were set in the brickwork so as to project about one inch and a quarter. This done, the surface gets a heavy coating of rather thick coal tar mixed with the asbestos wool. When two or three coats of

this are dried a layer of asbestos cement something less than an inch thick is laid on, and over it a layer of chicken wire is drawn tight and fastened to the wire loops. Then another layer of asbestos cement goes on, and the whole coating is finished off with a jacket of duck coated with asphalt varnish. The top of the boiler is covered with cement concrete rather than with the coating just described on account of its greater resisting power when often walked over, as is the fate of boiler coatings. This comparatively simple process of protecting a boiler setting against leakage and loss of heat is fairly cheap, easy to accomplish and quite effective in checking losses. Experience indicates that the saving of coal insured by the process is enough very frequently to pay for the expense perhaps even in a few months. The boiler is commonly the weak point of the generating system, and when it can be helped out so easily neglect would seem to be most unwise.

The splendid economies and service electricity is capable of yielding have at last been brought home to most manufacturers. Its great power for production made its use imperative in war industries, and, knowing its possibilities, industry will no longer part with it

Permanent Outdoor Substations

THE outdoor substation has now taken its place as part of the regular machinery of power transmission. It had its origin mainly in the extreme difficulty and expense of getting the high-tension leads into and out of an ordinary substation, resulting in an absurdly large and expensive structure for a relatively small output. The outdoor equipment very naturally took the simplest possible form, being derived directly from the ordinary pole distribution of transformers. It consisted generally of four ordinary standard poles framed together, with the transformers between them carried on a platform, while the accessory apparatus was variously mounted on the structure above. The danger of fire soon became an obvious one, not only fire originating in the apparatus, but flames coming from the outside—for example, from grass fires.

In last week's issue S. B. Hood gave some interesting details of a very convenient form of fireproof outdoor substation built to last. The ordinary wood poles are replaced by steel ones set in concrete. The wooden platform for the transformers is replaced by a concrete blanketing over the space between the poles, and the whole is protected by a wire fence with top guards to prevent intrusion. The whole thing is extremely simple and durable, and its cost, although somewhat above that of a wooden structure, is still very low compared with the output. It has the advantages of permanence which one generally ascribes to an old-fashioned closed-in substation, but it combines the advantage of the outdoor type of substation with a cost which makes it a thoroughly practicable structure, even for relatively small output. The fact that substations of this general character are finding their way into very general use in all the kinds of climates which these United States can furnish is evidence of their permanent usefulness.

Cancellation of Government Contracts

CANCELLATION of government contracts is inevitable. Let it be done wisely. Every one knew that the time would certainly be reached some day when the orders for military and naval supplies would cease, when different orders would be required if plants were to be kept in operation. Only a prophet, however, could have foretold long in advance what exact dates on the calendar would mark the sharp stoppage of the tide. And manufacturers, no matter how successfully they look ahead in days of peace, cannot base their war-time business on elements of prophecy; in that business they did what the military establishments of the nation asked them to do. In the normal course of operations when they face only the regular manufacturing problems, they can feel into the future to determine their policies as to buying stocks of raw materials, expanding plant, increasing or reducing the working forces; but when they are mobilized into the military resources of the country they cease to function as independent units, they become a willing part of the vast effective war machine. This, in brief, is what the branches of the electrical industry which are concerned with the manufacturing and distribution of apparatus and supplies have, to a large extent, experienced from the sweeping changes wrought in the industrial structure by the heavy war requirements.

Acceleration of the government war machine has stopped; the movement becomes slower and slower. Demobilization has started. The "mopping up" is rapid. Every brain, every hand is being turned toward production for the new peace era. We do not need munitions, we do need other products. Stop the war work; start the pursuits of peace. That is the simple way, and if it could be arranged as easily as it is expressed problems would disappear like the dew before the sun. But there is a rigid business problem which is inescapable. How are these contracts, which were made in the vital interest of the nation during the grave world crisis, to be liquidated? Two extreme courses are in general open to the government authorities: They may cancel with the heavy power of authority, letting the axe fall where it will, or they may let the contracts be carried out and the unneeded products be made. The first of these courses has in its favor the argument that the authorities would lessen the burdensome war debt; it has against it the very practical and objectionable feature that it means that the operation of factories may be stopped and labor thrown out of needed employment. The second course would assure a longer period for the manufacturer to continue operations, keep labor employed and plan for the future; but it would do all of this at the cost of further addition to the stupendous expense of the war. There are great questions of public policy in these issues; there are questions of purely political expediency which should be small. We can face the issue as one touching closely the whole of the nation, as a public welfare issue of intense and far-reaching importance, or we can see it handled, perhaps only because of the lack of proper consideration, as if it were a matter of petty politics.

We think that the attitude for the authorities to adopt is clearly not either one of the extreme courses, but a

fair, generous middle path. All elements in the nation are in the boat together. We pooled our resources for a righteous victory and we got it. We expected to pay a price, a big one if necessary, and the price will be paid. But in paying it every one concerned will do well to remember that we are still in the boat together and that rocking the craft is always a dangerous pastime and sure to be unpopular. It is in the deepest interest of the nation that the orderly processes of government and industry shall be sturdily maintained at this critical juncture. Having taken the manufacturing establishments and their working forces for war purposes, it would not be just for the authorities to put them cold-bloodedly in a position where they will have large pay-roll expense and will lack materials for normal products, and will also be without markets. They cannot regain in an instant the markets from which they have been separated by priority regulations. Some will need more time than others. This can be given best by a mutual arrangement which shall recognize frankly that we are still meeting expenses due to the war. It is better that the nation shall shoulder expense than that the manufacturer and his labor shall suffer as a result of abrupt cancellation of war contracts. An individual manufacturer can tell the government how much and what of the raw materials he can use for other than war products and how soon he can be in touch with normal markets. Until that is done and a workable plan is developed and put in practice the government should be willing to defer cancellation, if the manufacturer finds that course essential for the protection of his plant and labor against disaster.

The electrical industry faces the brightest period in all its history. War has given it a growth many times normal and advertised it as it was never advertised before. We need not therefore sit around with our hats on like Quakers waiting for inspiration. If we seize the opportunity, a golden future is assured.

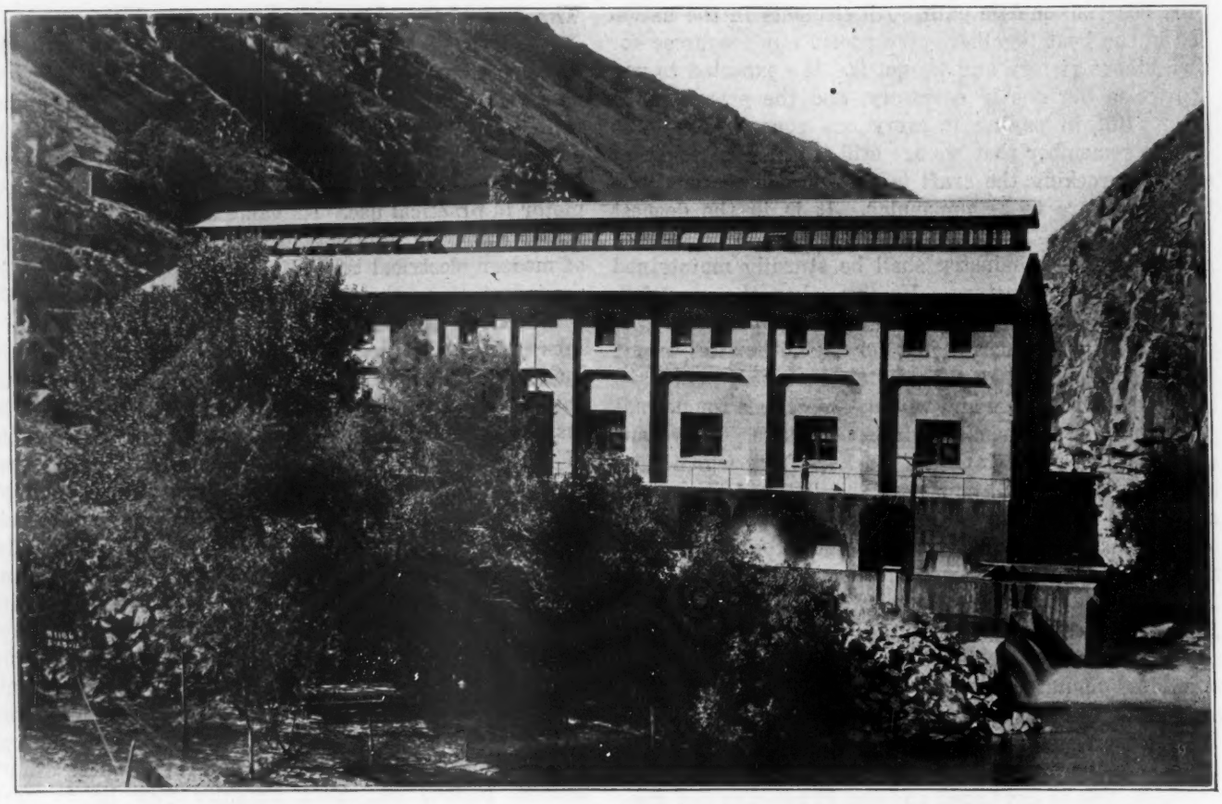
Operating Records

THE subject of operating records is one which has been threshed over by central-station men to an almost unlimited extent. In some plants these records are kept with minuteness of detail which probably costs more than it saves; in others with a reckless disregard of detail which renders them almost valueless. Charles C. Raitt's article on this subject in this week's issue gives a somewhat comprehensive account of necessary records and the bearing which they have on operation. If we were to summarize his conclusions, with which we heartilly agree, it would be in a single sentence: Keep your records, simple or elaborate, always rigorously up to date and in such form that they can be immediately inspected and discussed. It is quite an easy thing to overdo system so that the working force becomes the slave to notebooks, but a little forethought will make it possible to get together promptly and keep together effectively all the information that is really needed, extending from the simplest sort of thing to the most thoroughgoing and complete records of performance.

The Use of Synchronous Motors

IN VIEW of the increasing trouble experienced with low power factor as motor load increases the synchronous motor is steadily assuming greater importance. Will Brown in his article in the current issue follows up his consideration of power factor by pointing out some of the characteristics of the synchronous motor in practical use. Its value in dealing with power factor has been appreciated from the very beginnings of modern electrical transmission. In fact, some of the very first three-phase machines installed were of the synchronous type, fitted with auxiliary starting windings in the pole pieces. The great convenience of the induction motors, however, put the synchronous machine into the background for a long time, until the insistence of the power-factor question brought it out of its retirement. It is easy enough to make a synchronous motor which will start light without difficulty; it is not easy to produce one which will start with a fair amount of load and pull into synchronism without demanding excessive current. The synchronous machine comes up to the slip speed which it possesses as an induction motor fairly easily, but this speed, as in other induction motors, falls off with the load, and pulling into synchronism becomes progressively more difficult as load increases. If the starting torque is increased by increasing the resistance of the auxiliary winding, there is more slip and consequently greater speed difference in pulling in. This difficulty may be in part remedied by rheostatic control of the auxiliary windings, which, however, is a device seldom used.

One thing on which Mr. Brown lays emphasis, and which is important to remember in this connection, is that in designing a self-starting synchronous motor the ordinary alternator with narrow pole span is a bad beginning. In other words, a synchronous motor to start well under load requires a compromise design which shall both give it better starting power as an induction motor and incidentally greater opportunity to obtain some advantage from flywheel effect. In point of fact there is no difficulty in accomplishing all this, but, on the other hand, no considerable starting torque is generally necessary, since either by mechanical or magnetic clutch load can be picked up without difficulty. And since the synchronous motors are usually of considerable size, they are most often applied to the driven load through shafting and can consequently be clutched in without any particular inconvenience. At all events, the process is one which does not have to be gone through with frequently, which is perfectly familiar in mechanical drives and which involves no special complication. With a magnetic clutch flywheel effect can easily and advantageously be applied. The fact that a synchronous motor requires an exciter is not really a material disadvantage, especially in machines of large output. Taking the whole situation together, there seems to be no reason why the synchronous motor should not be used much more extensively than it is at present, thereby greatly relieving the now serious power-factor situation. Motor load is becoming steadily a greater and greater factor in electrical supply, and with it steps must be taken to see to it that injudicious application of motors and occasionally motors of bad characteristics are not allowed to interfere with the practical efficiency of the distribution.



INTERCONNECTION HAS CONSERVED THE POWER PRODUCTION OF EACH UNIT IN THE SOUTHERN CALIFORNIA GROUP

Connected Load in War and Peace

Government Analysis of Business of the Southern California Edison Company Shows that the Industries Supplied in War Time Will Continue to Require Power for Production

BY S. M. KENNEDY
Secretary and General Agent Southern California Edison Company

A REPRESENTATIVE of the War Industries Board, Major George F. Sever, has been making investigations regarding power conditions on the Pacific Coast for some months past, with the object of learning if there are any industries necessary to the carrying on of the war which might be suffering from lack of electric power. The inquiries made also embraced the building plans of the different power companies and their financial ability to carry out programs which may be necessary to enable them to supply power in sufficient quantities to meet the expected demands during the war period. In connection with this investigation it is of unusual interest to note how the load of the Southern California Edison Company measured up after a most critical analysis had been made by the government's expert.

The Southern California Edison Company operates in the city of Los Angeles, and from that center the company's lines extend for a distance of approximately 100 miles (160 km.) to the north, east and south and 25 miles (40 km.) to the west, the limitation in the westerly direction being the Pacific Ocean. In addition, there are two subsidiary companies—namely, the Mount Whitney Power & Electric Company and the Santa Barbara Gas & Electric Company—which distribute energy in territories immediately north of the Edison company's sphere of operation. Altogether there are approximately 100 cities and towns furnished with service, and in addition the requirements of an extensive intervening agricultural territory are supplied—these requirements consisting largely of power for pumping water to irrigate citrus and deciduous fruits, walnuts, vegetables, alfalfa, beans and sugar beets. The lines of the Mount Whitney Power & Electric Company and the Santa Barbara Gas & Electric Company are connected with the Edison company's system, and the figures given below concerning the details of load include the loads of the two subsidiary companies.

In connection with a well-developed plan for the conservation of all hydroelectric energy available for use in southern California, interconnections have been made for the supply and interchange of power between all the companies operating in the territory from Fresno, in the north, to San Diego, in the south, an extreme distance of about 350 miles (560 km.). The companies tied in with the Southern California Edison Company are the San Joaquin Light & Power Corporation, the Southern Sierras Power Company, the Los Angeles Gas & Electric Corporation, the Los Angeles Aqueduct & Municipal System, the Ontario Power Company, the

Ojai Power Company and the San Diego Gas & Electric Company.

The Edison company has a total maximum generating capacity of 222,000 kw., of which a little more than one-half is in hydroelectric plants. The peak load for 1918 was 180,000 kw. The total connected power load as of August, 1918, was 353,595 hp.

The analysis of the connected load first required a segregation as to plants of 50 hp. and under and plants of more than 50 hp. The total connected load in plants with a capacity of 50 hp. and under was 117,262 hp., or 33 per cent of the system's total connected power load, and the total in plants over 50 hp. was 236,333 hp., or 67 per cent of the total connected power load.

THE FOUR CLASSIFICATIONS OF LOAD

The next classification pertained to the kind of load, or the use for which the energy was required. There were four segregations, namely, (1) war industries, these being direct contracts with some department of the government; (2) war essentials, or plants engaged in producing materials necessary for the conduct of the war; (3) public necessities, or energy required for purposes essential in the life of the country's communities, and (4) non-war industries.

In the first classification—war industries—the company showed a connected load of 4573 hp., or 1.3 per cent of total connected power load. This was divided among three industries, namely, shipbuilding, shoe manufacturers and sugar plants. The relative distance from the center of population of the United States and the scarcity of certain kinds of raw materials have tended to limit in southern California the number of enterprises having direct contracts for government requirements.

In the second classification—war essentials—the company showed a connected load of 171,393 hp., or 48.6 per cent of total connected power load. This segregation embraced the following industries—bakeries, canneries, chemical works, cottonseed plants, fertilizer plants, foundries and forges, ice and refrigeration plants, irrigation plants, machine shops, meat-packing houses, flour mills, oil wells, fruit-packing houses, paper factories and railway power. An important feature of the load under this classification is that 107,169 hp. is connected for irrigation purposes, almost entirely operating in connection with the production of food and foodstuffs.

The third classification—public necessities—showed 144,476 hp., or 40.8 per cent of total connected power load. Included in this segregation were amusements, battery charging, building supplies, cement plants, creameries, domestic uses, elevators, garages, ice-making and ice-cream plants, laundries, mining, motion-picture producers, newspapers and printing, packing houses, paper mills, public service, power sold for resale, quarries, railway power, schools, churches and libraries, tire factories, woodworking industries and a large number of miscellaneous plants. Some of the uses in this classification are also included in the fourth classification, a portion of the load being considered necessary, and the balance could be temporarily eliminated if conditions should require a reduction in amount of service.

The fourth classification — non-war industries — showed 33,153 hp., or 9.3 per cent of total connected power load. Included in non-war industries were breweries, brickyards, cement plants, elevators, garages, glass factories, laundries, mines, newspapers and printing, quarries and woodworking industries.

The examination demonstrated that 90.7 per cent of the connected power load of the Southern California Edison Company is required for war industries, war essentials and public necessities, and adding to this the normal lighting load, which is properly considered a public necessity, the total connected load amounted to almost exactly 95 per cent for these purposes. It is apparent, therefore, that of the total connected load for all uses on the company's entire system only a fractional percentage could be classed among non-war industries.

In connection with the foregoing analysis there are two features worthy of note: First, the representative of the War Industries Board did not deem it necessary to issue any instructions or make any suggestions to the officials of the Southern California Edison Company regarding the channels into which its electric energy should be distributed, it being evident that all available power was being put to the best use and that no essential industry was in danger of an insufficient supply. Second, the investigation plainly indicated that without regard to the question of when the war should end, all the industries now being supplied with power by the company would continue to require power, as none of them depended upon the war for its origin or upon the duration of the war to insure its continued existence.

THE experience of the past among nations has taught us that the attempt by one nation to punish another by exclusive and discriminatory trade agreements has been a prolific breeder of that kind of antagonism which oftentimes results in war, and that if a permanent peace is to be established among nations every obstacle that has stood in the way of international friendship should be cast aside. It was with that fundamental purpose in mind that I announced this principle in my address of January 8. To pervert this great principle for partisan purposes and to inject the bogie of free trade, which is not involved at all, is to attempt to divert the mind of the nation from the broad and humane principle of a durable peace by introducing an internal question of quite another kind. American business has in the past been unaffected by a policy of the kind suggested, and it has nothing to fear now from a policy of simple international justice. It is indeed lamentable that the momentous issues of this solemn hour should be seized upon in an effort to bend them to partisan service. To the initiated and discerning the motive is transparent and the attempt fails.—*Woodrow Wilson.*

Boiler-Setting Radiation and Air Leakage

Results of Experiments to Determine Best Method of Covering Boiler Settings to Bring About a Reduction in Radiation and Escape of Air—Type of Covering Which Saves $1,000 per 500-Hp. Battery per Year

BY E. S. HIGHT
Chief Operating Engineer Illinois Traction System

FOR the purpose of determining the most economical methods of preventing infiltration of air and preventing radiation from the side walls of boilers, an extended investigation has been conducted by the Illinois Traction System. Three general methods were considered—incasing the boiler setting entirely in sheet iron, covering the top of the boiler setting and of the side walls with a thick coating of tar, pitch, asphalt or other materials in which were stirred quantities of magnesia or raw asbestos, and covering the boiler settings with heavier coatings such as are applied to steam piping and other highly heated metal surfaces. It is the purpose herein to describe briefly the methods which were found to be most satisfactory considering first cost, maintenance expense and benefits attributable to making the installation. Because of the fact that the method of covering these settings has been applied primarily to Stirling boilers, of which the Illinois Traction System has by far a greater number than of any other kind, this discussion has been confined entirely to Stirling equipment.

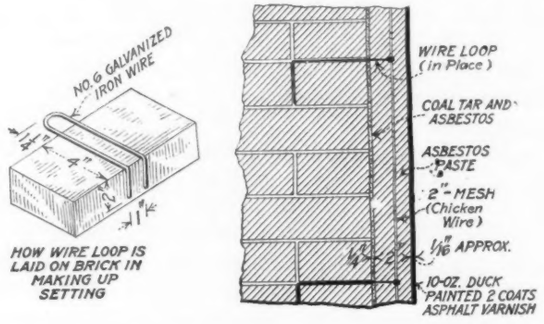
How the Boiler Walls Are Covered

One of the methods of covering the walls is shown somewhat in detail in the accompanying drawing. It will be noted that wire loops made of No. 6 galvanized wire are installed in the brickwork. These loops are made up in such a manner that about 1.25 in. (30 mm.) of the loop projects outside of the finished brick surface of the boiler setting, while the remainder of the loop passes into and down behind the course of red brick which constitutes the outer wall of the setting. These loops are now placed on all new boiler settings which are built in the plants of the Illinois Traction System.

After a boiler setting has been completely finished a coating of coal tar is applied which has been boiled to a consistency somewhat thinner than pitch and into which has been stirred asbestos wool. A heavy brush similar to a whitewash brush is usually employed to apply the mixture. As much of the material is placed on these bricks as it is possible to make stick, and this usually amounts to two or three coats. After this has dried a mixture of asbestos paste or asbestos cement is applied to a thickness of approximately 1.25 in. (30 mm.), which brings the level of the coating to about the end of the loops which are sticking out of the side of the setting. Before this application has dried a layer of chicken wire of 2-in. (5-cm.) mesh or less is stretched tightly over the entire boiler setting and fastened by small wires to the loops that protrude. Over this is placed another layer of asbestos paste or cement so that the final total thickness of the asbestos covering is approximately 2 in. (5 cm.). This is permitted to dry thoroughly and covered with 10-oz. (290-gm.) duck, which is pasted down tightly and fastened at the edges by means of wires or with metal straps along the steel beams and columns of the boiler setting. The duck is then painted thoroughly with two coats of asphalt varnish or a very heavy asphalt paint of good grade.

After a covering of porous brick of the nonpareil type with a covering of red brick has been placed over the drum and tubes, the top of the boiler setting is usually covered with a coating of 2 in. to 2.5 in. (5 cm. to 6¼ cm.) of concrete in which the constituents are present in a ratio of approximately 1:2:4. The side covering is not used on top of the boiler because of the continual necessity of walking over the top of the setting, which would in a short time destroy the adhesiveness of the asbestos paste and make a powdery sort of material on the top that would not impede the transference of heat in the manner that solid asbestos would be sure to do.

This type of covering, of course, is readily applicable



METHOD OF ATTACHING INSULATING COVERING TO BOILER SETTING

to any type of brick boiler setting. While it is difficult for the first time to properly insert the loop in a boiler setting which is already in place, it is possible to drive loops between the bricks so that they will hold such a covering very satisfactorily. They need not be used in any larger number than is indicated on the accompanying drawing, but there should be approximately that number to insure the covering holding tightly to the side of the brickwork.

Although it is expensive to install such a covering on a boiler setting already in place, it has been found by the engineering department of the Illinois Traction System that it is well worth the expenditure. The saving effected by having an airtight setting and one which reduces the radiation very materially is sufficient in the course of even six months, provided that the boilers are run at full load and at a reasonable load factor, more than to repay the first cost of the installation of the covering. Of course, when the boiler setting can be built new from the floor, the loops can be inserted at

practically no additional expense, except a slight one for the time of making them, and in this case the only cost of installing the covering is that of the materials and the labor of fastening it on the outside of the setting.

This type of covering was installed on a battery of 370-hp. Stirling boilers of which the setting was already in place, for approximately $150 complete. This same covering at the present time, owing to higher prices, costs approximately $200 to $250 when installed. The total cost for labor and material for applying this covering to the outside of a battery of two 500-hp. boilers which were constructed new during this last spring was $400. It is estimated from the increase in operating economy at the first plant after this type of covering had been applied to the boiler that the saving to the company per battery in a course of a year was over $500. In the second case, while the operation has not been carried on long enough to determine with any degree of accuracy what the final saving will be, it is conservatively estimated that it will be not less than $1,000 per battery per year. This is based on full-load operation approximately 50 per cent of the time, which is the general condition obtained at the first plant in question.

The general conclusion has been reached from the various tests conducted that of all of the types of coverings considered, from steel casing to ordinary commercial products, the one described herein is the most economical from the standpoint of first cost and the saving which the company may obtain from its installation. This method of covering has the additional advantage that it will produce a relatively equal amount of saving on either hand-fired or stoker-fired boilers and on very small or very large boilers, although its percentage of the coal saved on the smaller boiler settings is liable to be greater than on the larger ones.

ADMITTING AIR THROUGH THE FUEL BED

After this method is adopted to stop all possible leakage of air into the furnace, it is a good policy to consider the admission of the proper amount of air under and through the fuel bed. The economy of combustion and the efficiency of the boiler equipment can be very markedly increased and have been increased by this means in plants of the Illinois Traction System from 3 per cent to as high as 10 per cent.

During the last seven years the operating engineering department of the Illinois Traction System, which is at Peoria, has exercised direct supervision over the operation of the twenty-two power plants of the Illinois Traction System in Illinois, Iowa, Missouri and Kansas, in so far as the economy of operation and the means of converting the energy in the coal into electrical energy have been concerned. The results of applying the method described herein and other methods of increasing the economy have resulted in the saving in five years of over $250,000 in coal expense. It is firmly believed that the application of the type of covering outlined above, together with other careful and close supervision of the covering of high-temperature piping and the careful supervision of the admission of air to the fuel bed will still further increase this saving during the coming year. The first five months of operation this year point conclusively that way.

REINFORCED CONCRETE SAVES STEEL IN POWER PLANT

Example of the Extent to Which Steel Can Be Replaced if Unavailable—Expediency and Not Economy the Important Factor

IF THE steel shortage should become more acute, power plant designers would probably themselves be surprised to find how far they could go in the matter of substitution of other materials for steel. Fortunately, engineers have not yet been put seriously to the test. Here and there are isolated instances where partial attempts have been made to reduce the amount of steel used, but few sweeping examples of substitution are found in this country to-day. For this reason it seems important to publish a general account of a power station design wherein an extraordinary effort was made to use materials other than steel. While the idea of steel saving, essentially as a conservation measure, may not have been the guiding motive of the engineers, the resultant design is none the less interesting and important as a pioneer example.

The station in question is the 15,000-kw. plant of the Universal Portland Cement Company, Buffington, Ind. In the design an attempt was made to utilize reinforced concrete as far as possible. The station is constructed entirely of reinforced concrete with concrete-block curtain walls and hollow concrete roof-tile covering. It is separated into two parts by a concrete-block division wall. The foundations are of the mass concrete type built on a sand-bearing surface, concrete piles being used wherever necessary to take care of the heavy loading coming on them. No unusual features were encountered in their design. The framework of the building is of the self-contained skeleton type, such as is being used in recent warehouse building construction, and carries the concrete-block curtain walls.

The stresses allowed in the design of this building were as follows: Steel in tension, 18,000 lb. per square inch (1250 kg. per sq.cm.); concrete in compression; 700 lb. per square inch (50 kg. per sq.cm.); concrete in direct compression, 550 lb. per square inch (39 kg. per sq.cm.); concrete in shear, 40 lb. per square inch (3 kg. per sq.cm.). The main generating or turbine floor was designed to carry a superimposed load of 500 lb. per square foot (2440 kg. per sq.m.). While this is slightly under the load caused by the heaviest machine part likely to be placed on it, it was deemed sufficient. The floor varies in thickness from 6 in. to 11½ in. (15 cm. to 30 cm.) and is reinforced with ½-in. (1.2-cm.) diameter rods.

The design of the columns presented no unusual features. They are square and rectangular in shape. Those in the center of the transforming section, supporting the second floor, measure 24 in. by 24 in. (61 cm. by 61 cm.), and those supporting the third floor measure 21 in. by 21 in. (56 cm. by 56 cm.). Those supporting the roof girders measure 18 in. by 18 in. (45 cm. by 45 cm.). The remainder of the columns in the building are rectangular in shape and measure 27 in. by 33 in. (68 cm. by 84 cm.). All columns are reinforced with round rods of different sizes and numbers according to the strength required to take care of the loads they carry. The columns that carry the crane runway girders

are reduced in section above the girders to 15 in. by 33 in. (38 cm. by 84 cm.), and these in turn carry the roof girders. Especial care was taken to see that any tendency to bending in these narrow columns due to wind racking was properly provided for.

The crane runway girders were designed to carry a 30-ton traveling crane and are 18 ft. (5.4 m.) span, 41 in. (104 cm.) deep and 18 in. (45 cm.) wide, reinforced with four 1⅝-in. (4-cm.) diameter rods in the top and bottom and the necessary rods in the web to take care of the shear. The roof joists were designed to carry a total roof load of 60 lb. per square foot (293 kg. per sq.cm.) on an 18-ft. (5.4-m.) span. They are 18 in. (45 cm.) deep by 7 in. (18 cm.) wide and are reinforced with one 1½-in. (3.8-cm.) diameter rod in the bottom and two ⅞-in. (2.2-cm.) diameter rods in the top. These roof joists were premolded on the ground and hoisted into place when the forms for the roof girders were constructed, the reinforcing rods being arranged in such a manner as to secure a firm joint with the main girders when they were cast. This method of roof construction has been followed for some years by this company with good results as it eliminates the necessity of building forms and supports up in the air for these joists.

The design of the main roof girders which support the roof joists involved some unusual features on account of the length of the span, which is 63 ft. (19 m.). The girder is 18 in. (45.7 cm.) wide and 71 in. (180 cm.) deep at the center. The top surface slopes with the roof ½ in. in 12 in. (approximately 4 cm. in 100 cm.), the bottom surface being horizontal for a distance of 41 ft. (12 m.). From this point it tapers down to a depth of 66 in. (168 cm.) at the connection of the girder to the columns. The girder is reinforced with eight 1⅝-in. (4-cm.) diameter rods in the bottom and eight 1½-in. (3.9-cm.) diameter rods in the top. The shear rods in the web are ⅜-in. (0.94-cm.) diameter rods in the form of vertical stirrups. The majority of the girders in this building were designed with compression reinforcement with the idea of keeping the depth and width of the girders down to the minimum and to keep the appearance consistent with the entire design.

The roof is composed of hollow reinforced-concrete slabs, shipped to the job and laid on the roof joints. On top of the slabs was laid a composition tar and asbestos cement roof covering to make the job water proof.

All the concrete in the building above the foundations was mixed in the proportions of one cement, two sand and four pebbles passing a 1-in. (2.5-cm.) ring, with the exception of the concrete in the columns carrying the crane and large roof girders, which was mixed one cement, one and one-half sand and three pebbles. This difference was made to take advantage of the extra strength of the richer mixture.

The floors in the transformer section of the building were designed for a floor load of 150 lb. per sq.ft. (732 kg. per sq.cm.), are of the usual girder and slab construction and present no unusual features. All the switch cells, busbar structures and supports were made entirely of concrete either cast or plastered on expanded metal, which gives an entirely fireproof structure throughout.

PRORATING LINE LOSS

How a Company May Be Equitably Charged for Line Loss When It Is Connected to a Line Already Serving Another

A problem sometimes arises in which it is necessary to prorate line losses between two companies. For instance assume that company A is purchasing power over a transmission line with a loss of 5 per cent. It is desired to purchase over the same line an additional block of power to be delivered by company A to company B, the line loss being increased to 10 per cent. It will be obviously incorrect to bill company B at the purchase price increased by 10 per cent for line loss and an allowance for profit, since the additional load delivered to B has also increased the loss on the load delivered to A, which increase is also a proper charge against B. Thus, if the line delivers to A 1000 kw. with 5 per cent loss (in terms of energy received), or 50 kw., and an additional 1000 kw. is purchased for B's account, the loss will be increased to 10 per cent of 2000 kw., or 200 kw. The loss properly chargeable to B is therefore 200 kw. less the original 50 kw. loss sustained by reason of A's load, which equals 150 kw., or 15 per cent of B's load.

The proper loss in per cent chargeable against an additional block of power may in any case be found by multiplying the per cent loss in the original block by a quantity equal to 2 plus the ratio of the added block to the original block.

This may be proved as follows:

Let L = loss in kilowatts;

W = delivered power in kilowatts.

Required to find X, the per cent of line loss chargeable against an additional block of power expressed as a percentage of that block.

We have:

Per cent loss = $100\ L/W$.

The loss chargeable against the primary block = L_a.

The loss chargeable against the second block = $L_{a+b} - L_a$.

And the required per cent is:

$X = 100\ (L_{a+b} - L_a)/\ W_b$;

$X = 100\ L_a\ [(L_{a+b} - L_a)/L_a] \div W_b$.

But in any circuits the I^2R loss is proportional to the square of the power delivered; therefore $L_{a+b}/L_a = W^2{}_{a+b}/W^2{}_a$.

Substituting:

$X = 100\ L_a\ [(W^2{}_{a+b} - W^2{}_a)/W^2{}_a] \div W_b$

$X = 100\ L_a\ (W_{a+b} + W_a)\ (W_{a+b} - W_a) \div W^2{}_a W_b$

$X = 100\ L_a\ (2W_a + W_b)\ W_b \div W^2{}_a W_b$

$X = 100\ L_a\ (2 + W_b/W_a)/W_a$

which is the per cent loss of the original block multiplied by 2 plus the ratio of the second block to the first.

It will be noted that as W_b approaches zero the multiplier approaches 2; therefore the per cent line loss in the increment is never less than twice the per cent line loss in the original block. When the two blocks are equal, the per cent loss chargeable against the additional block is three times the per cent loss in the original block.

Concrete Brick for High-Tension Cells

Compartments Made with This Material Have the Advantage that They May Be Put in Service Immediately—They Are Also Quicker and Less Expensive to Construct than Those Built of Other Materials

BY E. B. MEYER
Assistant to Chief Engineer, Public Service Electric Company of New Jersey.

MANY expedients have been developed and many lessons in economy have been learned during the trying times now passing that may be put to use with equal benefit in the period ahead. It would be a serious mistake indeed to forget them, and a valuable service to the industry will be overlooked if every engineer does not make it his duty to give others the benefit of his experiences. It is to relate one such economy and expedient that this article has been written.

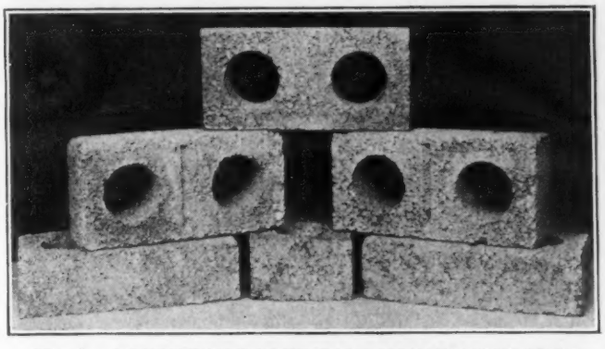


FIG. 1—CONCRETE BRICKS USED FOR HIGH-TENSION CELLS

To supply the needs of industries working on war contracts it has been necessary in many cases to furnish the industries with high-tension service and provide and install the switching equipment at the customer's substation. Usually the demands for service were so urgent that the company had to use all the resources at its command in order to meet the customer's requirements. Where the central station had to finance the work the cost had to be kept low, first, because of the high money rates, and, second, because many of the installations were more or less temporary in character and might have to be written off in a few years. Where it was necessary to provide high-tension equipment on the customer's premises, switch cells and bus compartments had to be erected. Proper attention to the matter of proper design and construction of these compartments resulted in a considerable money saving, particularly in large installations.

One large electric company which has had to furnish high-tension service to many customers during the last two years has, after considerable experimental work, adopted concrete brick for the building of switch cells and bus compartments both in stations and substations. Usually these structures have been built with smooth or faced brick, while in other cases monolithic construction has been employed. The serious objection to the use of brick under war conditions as well as at the present time is that it cannot always be obtained within a reasonable time, and where the work consists of an extension to an existing structure it frequently happens that the new brick does not match the old.

While monolithic concrete construction is a very reliable substitute, the fact that expensive wooden forms have to be employed makes this type of construction undesirable. From an operating point of view, monolithic construction has a further disadvantage in that the concrete has to be poured wet and the dripping of water from the new compartment into other compartments is both inconvenient and dangerous. In many installations, particularly in those where service must be supplied in the shortest possible time, it is necessary to put each compartment into service as soon as it is completed. With the use of monolithic construction this is not practicable because of the fact that moisture is apt to leak from cells in process of construction, causing short circuits and consequent service interruptions.

One of the special methods of meeting this problem, not only as it applies to customers' substations, but also in large power stations and substations, has been the use of the special concrete brick illustrated in Fig. 1. These bricks are made in the proportion of one part cement to one and one-half parts of sand and two parts grit or pebbles, which have been passed through a ¼-in. (6-mm.) screen. The materials are mixed dry because experience has shown that even a slight excess of water causes a ragged surface due to the drag when the bricks are being removed from the machine. The machine employed is of the lever compression type originally designed for making large concrete blocks but modified to make standard bricks.

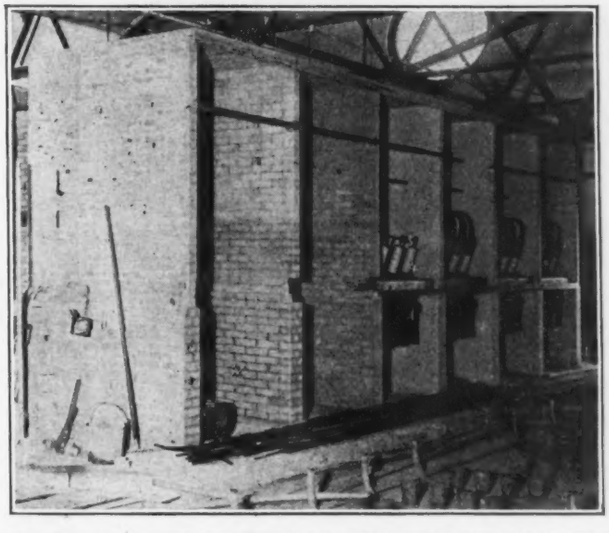


FIG. 2—PARTLY COMPLETED CELLS WITH OIL SWITCHES IN FAR ONES ALREADY OPERATING

More than 1,000,000 bricks have been made by the company mentioned, and it has been found that with one man mixing and two men operating the machine

the average output for a nine-hour day is about 2000 bricks. After forming in the machine the bricks are racked on trucks holding about 800 bricks and are removed to a steam room to be cured in a moist atmosphere at a temperature of about 120 deg. Fahr. (49 deg. C.). The process requires twelve hours usually, after which the bricks are ready for use.

The bricks are of standard size, 8 in. by 4 in. by 2¼ in. (20 cm. by 10 cm. by 5.6 cm.), with two 2-in. (5-cm.) holes along the center line. These holes afford space for control conduits or for reinforcing, if such reinforcement is thought necessary or desirable. A V-notch is molded into the bricks to facilitate breaking them with a chisel or trowel, which is required in breaking the joints on alternate courses.

THE CELL AND BUS STRUCTURES

In Fig. 2 is illustrated a cell structure, part of which has been completed and the equipment put into service. The oil switches which have been placed in service may be seen at the far end. A bus structure with bus insulators and bus mounted complete is shown in Fig. 3. In this installation concrete slabs with cast-in inserts are used for supporting the bus insulators. The slabs are cast in wooden forms and after proper seasoning are built into the brick structure as the work progresses. A reactance-coil compartment built of concrete brick with wire-mesh doors on the front for protection is shown in Fig. 4.

Compared with poured concrete, the concrete brick

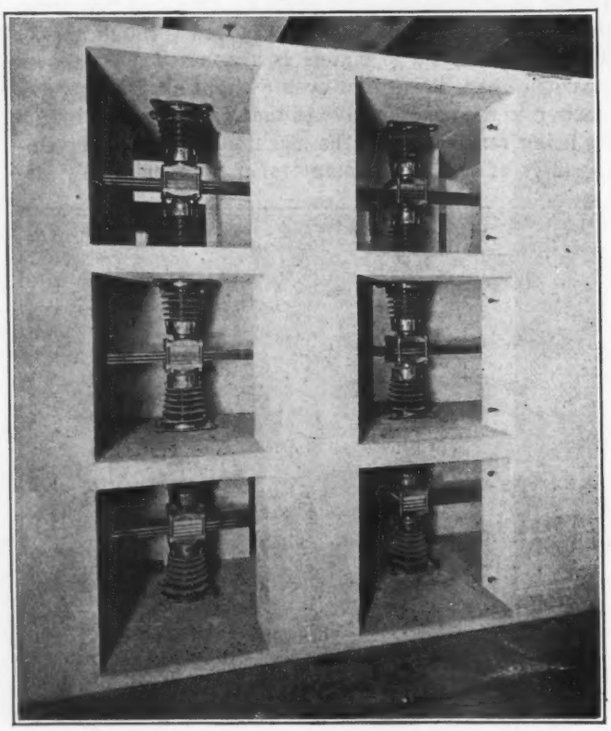


FIG. 3—BUS STRUCTURE MADE OF CONCRETE BRICK WITH CONCRETE-SLAB PARTITIONS

has the advantage of being readily adapted to varying sizes and shapes of compartments and permits of quick construction of a job with but one class of labor and material. The average number of bricks that may be easily laid per day is about 200. If a poured finish is desired the completed cells are treated with cement wash worked with a trowel to a hard finish. If a brick effect is desired, the points are raked when the bricks are laid up and are later filled or pointed. The resulting

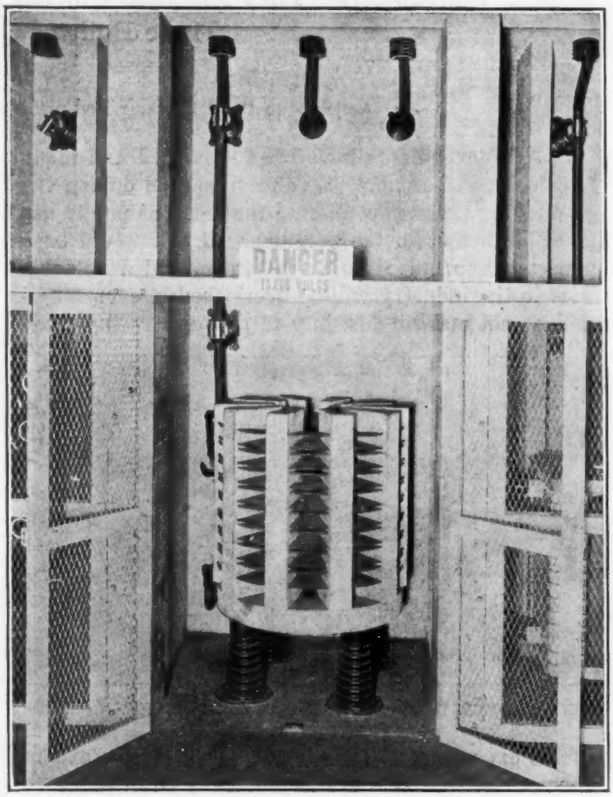


FIG. 4—REACTOR COMPARTMENT MADE OF CONCRETE BRICKS

structure is stronger than pressed brick and is considerably cheaper as has been ascertained by actual cost records.

IT IS time to look ahead to the future of American business and industry. Our tax measures should be so devised as to encourage and stimulate rather than to burden and repress them. I, therefore, recommend the immediate amendment of the pending bill so as to provide that, with the collection of the taxes levied upon war and excess profits for the calendar year 1918 and payable in the year 1919, the war and excess-profits taxes shall come to an end, except in so far as may be necessary to subject to these taxes profits which, though arising from the contracts entered into during the war period, would, under existing regulations, technically be profits of 1919 and not profits of 1918. I can think of nothing which would do more to encourage industry and enterprise than this measure, carrying with it as it would the assurance that with the cessation of war there will come cessation of taxes on so-called war profits and war excess profits.—*Secretary of the Treasury McAdoo.*

Keeping Operating Records

Basic Requirements of Records—What Records Are Essential—How Accuracy May Be Maintained—Station Records, Line Records, Construction Records and Their Proper Checking

BY CHARLES C. RAITT

THE economies and increased efficiencies demanded of all central stations during the war period can not be forgotten now that peace is at hand. In fact, these measures will be even more necessary during the reconstruction period which is just opening. To improve the operation of central stations we must first know how efficiently we are operating. For this reason some of the ideas and convictions of the author concerning the proper operating records for a central-station company to keep and the way in which to keep them will be given in this article. The decision of just what records are necessary rests to some extent upon local conditions, yet there must be some well-defined general principles that will apply to all central stations, and it is these general principles that the author wishes to bring out.

RELIABILITY IS IMPERATIVE

First the records must be "reliable." That is not an easy requirement. How often we find when we check up our line maps that a certain extension has not been recorded, or certain transformers have been changed and no record made of the change. How many companies know positively just which of the poles they are using are their own property, which are jointly owned, etc.? If no records have been kept, there is nothing to depend on but the memory of the men who set the poles.

The next demand is that the records must be kept up to date. If important changes are made in the routing of certain feeders, it is not sufficient that this information will be recorded eventually. An emergency may arise the very next day that will make it imperative for all concerned to know about the changes involved.

Records must also be adequate. Scarcely a day passes when some one does not want some information on past performance that has never been recorded or that has been lost. To record any information that may be needed concerning present and past conditions in the operating departments may be an ideal that is impossible to reach, but it is one toward which companies should constantly strive.

Some of the larger central-station companies of the country have organized large record departments in which dozens of clerks are employed. The daily operation is tabulated in detail in these departments, and frequent reports are prepared and distributed, covering every branch of work. One company, for instance, employs eight clerks to do nothing but keep track of the street-railway load which is carried by that company. There are other companies of size comparable with the one just mentioned which keep very few operating records, and these are handled as a side issue by two or three clerks who were employed primarily for some other purpose. Between these two extremes there may be found all degrees of development.

One of the most frequent and expensive faults among central stations is the spasmodic effort at keeping records. For instance, in one company complete records were made of all poles used by the company and the line material attached, only to have these records dropped after they had been carried a while. Then a few years passed and again some one decided that the company should have these records. By this time the old system was so out of date that it was necessary to start all over again. The result is that the company had all the expense of getting the records without any of the benefits of them. True, it may not always be necessary to have such detailed information as that mentioned above; but the time to settle that question is before the expense is incurred.

There is a strong tendency to follow a cycle like that just illustrated unless there is a good stabilizing influence always at hand. When earnings are good and the company is expanding fast, it is very likely to start a more elaborate system of records than it really needs. The system may flourish for a while, but when the boom has spent its force and earnings drop back to normal or below there immediately comes a demand for curtailment of all unnecessary expenses. When the trimming process is over there is not likely to be much left of the record department. Of course, the wiser plan would have been to start the record system on a conservative basis where it might have been maintained even in slack times.

STATION RECORDS

In keeping records of the station operation there are a few essential items that should be found on the log sheets of every generating station, whether large or small. In the boiler room the principal items are coal burned and steam generated. If an accurate record of these two items is to be obtained, some way of measuring them over a definite period of time must be adopted. There are many large stations that have no such way of measuring and must depend entirely on estimates which are always more or less inaccurate. There are very good reasons in some cases why measuring facilities have not been provided. For instance, it is necessary, in order to get an accurate record of the coal burned over a twenty-four-hour period, to have some sort of weighing hopper or a system whereby all coal burned can pass over a platform scale. This type of apparatus is expensive to begin with, and in many cases of older plants which were built without any provision for these facilities it would be difficult to put them in.

In the absence of any equipment to weigh the coal burned each day, the next best thing is to measure it by some device which may be placed in the chutes leading to the stoker or a counter mechanism on the stoker

plungers. The accuracy of these methods depends largely on the uniformity of the coal used. Wherever any such method of measuring (not weighing) the coal is used it is well to check the figures by means of a monthly inventory of coal on hand. This may be done by laying off the coal pile roughly in 10-ft. (3-m.) squares and taking the elevation of the coal at each intersection.

By adding the coal received during the month to the inventory at the beginning of the month and subtracting the inventory taken at the end of the month the coal consumed is obtained. The author has used this inventory in connection with the counting of plunger strokes and has been able to check the two figures within less than 5 per cent under the worst conditions. There is no intention of giving the impression that these methods give as good results as weighing the coal, for they do not. They are only makeshifts at best, but they are better than nothing at all.

Next comes the measuring of the steam evaporated. There are several fairly accurate flow meters on the market that will measure the flow of steam over a given period, and it is well to have one on each boiler if possible. Where this is not practicable it may be possible to provide one such meter to measure the total steam evaporated. If even this is too expensive for the size of the plant, a fair estimate of the steam generated may be obtained from the feed-water meter. The losses between this meter and the steam header should be pretty constant and by no means hard to determine.

There are dozens of other boiler-room records which are kept in many plants, covering boiler pressures, feed-water temperatures, flue-gas temperatures, etc. These all have their place in determining the best methods of handling the boilers, but they do not get outside of the station and have no place in the permanent records of the company.

Of the turbine-room or engine-room records, those giving the generated output of each unit and the hourly or half-hourly demand readings on these units are most important. The input to all of the important feeders and the demand readings on them should also be recorded.

If there is a sub-utility operated by the company, such as a steam or hot-water heating system or a city waterworks plant, some data on these should be kept.

Checking Station Records

The accuracy of the records which the record department makes must necessarily depend on the care with which this information is obtained. It is only by the utmost coöperation between the record department and the various operating departments that it is possible to secure data that are reliable. From this point on the success of the record department depends largely on the support and encouragement which it receives from the management of the company. The clerical work involved in keeping the records requires a little more than average ability, and for that reason it must be expected that the department will cost something, but there is no doubt that it will pay its own way if properly handled.

The first step after the station records reach the record department is to check each log sheet and report that is received. The operators and engineers are likely to be busy at other things when the time comes to take readings, in which case the meters will be read hastily and there is abundance of opportunity for error. These errors can nearly always be detected by the record clerk if he is on the look-out for them. Constant vigilance is the price of accuracy here as elsewhere. For instance, an average of the demand readings on a given generating unit multiplied by the hours operated should give the output for that unit roughly. If there is any material difference between this figure and the difference of first and last readings on the watt-hour meter, it is certain that there is an incorrect reading somewhere. As soon as this is determined the error can be hunted down.

In case of converting equipment a very good check may be obtained by providing an input meter and an output meter and watching the efficiency of the machines day by day. Any radical variation in efficiency that cannot be readily explained by operating conditions is an indication of bad readings. Mistakes in subtracting meter readings are also common errors and must be carefully guarded against.

There are two load factors which are valuable as a check on the accuracy of the station records as well as being indicative of the character of the load carried. One is the twenty-four-hour-curve load factor, obtained by dividing the average load by the maximum demand. The other load factor is the plant factor, or the ratio of the average load to the rating of the station.

Another thing that helps to catch errors in the records and at the same time forms one of the most valuable reports that the record department can put out is the daily load curve. If the hourly or half-hourly demand readings for the total load and the important subdivisions are plotted on cross-section paper each day and the characteristics of this curve are watched day after day through the seasons of the year, much information can be gained that would otherwise escape notice. The curves may be drawn on tag stock, cut out with a sharp knife and filed by date. Since the contour of all the curves can be seen at once, it is possible to follow the seasonal characteristics of the load and also the effect of any serious temporary conditions. Such a method was described and illustrated by William Le Roy Robertson in the *Proceedings* of the A. I. E. E. not long ago.

All data concerning kilowatt-hour output, steam-generated and coal-burned, should be posted daily in some sort of summary, so that it can be readily totaled by weeks or months as required. Along with these records should be those of the sub-utilities, if any.

Frequency of Reports

It would be useless to specify just what reports should be made on these data or how often they should be made, since these are matters which depend on how rapidly the load characteristics change and on what the reports are to be used for. Once a month would not be too often to make a regular report of the more important features, such as total generated output, maximum load, load factor, evaporation rate (pounds steam per pounds coal), station water rate (pounds steam per kilowatt-hour) and coal per kilowatt-hour.

In the larger companies these data should be reported once a week or even daily. Where the methods of keeping records of coal burned and steam evaporated are not the best, it would be useless to try to make daily reports, as the chances for error are too great. By making the reports over longer periods the opportunities for checking the data are better, and thus the reports will be more reliable.

Whether regular reports are made daily or monthly, the important thing is to keep an accurate record of the operation all the time so that it will be available when it is needed. It is impossible to plan the future expansion of the system properly, and the additional equipment that such expansion involves, unless records are available which cover every season of the year.

LINE RECORDS

There is the widest diversity of opinion as to how much detail should be shown in the records of transmission and distribution lines.

If an attempt is made to record just how much line material is in service at all times, an unwieldy mass of clerical work will be involved in making adjustments for maintenance and new extensions. On the other hand, if no effort is made to keep this record at all, the record department is apt to be frequently embarrassed when asked for data by the state commissions, etc. Where the company is a large one and the extra clerical force required will not be a burden, it might be advisable to keep a running inventory of all line material in service. For smaller concerns it should be sufficient to keep track of the larger items, such as poles and wire.

Most central stations keep some sort of line maps, but they do not always serve the full purpose of which they are capable if properly kept. A line map is intended to show just as accurately as possible the position of the company's lines. If it does not show this accurately, it is worse than useless. If it is accurate and strictly up to date, it will never be necessary to send out an inspector before promising to give service to a prospective consumer.

There are a number of good schemes for making line maps, and the method used does not make so much difference. The principal thing to keep in mind is: "Do the maps show conditions as they are now—today?" If the answer to this question is yes, and if the records are not too complicated to be kept up by some one of average intelligence, they will serve the purpose for which they were intended.

There are two general types of line maps. One is the system based on a color scheme, where the single-phase and three-phase primary and secondary are shown in different colored inks. This method is good where it is only necessary to have one set of maps. But where several copies of the same set of maps are required it is better to use a system that can be made up on tracings and blue-printed.

The more detail shown on the line maps, the more work will be required in keeping them up. Furthermore, every extra symbol used tends to confuse the record so that a closer study of the maps is necessary to obtain any desired information.

Transformer records are probably more important than the records of any other line of equipment because they do not remain permanently in one position until worn out, but are constantly being changed about as the load grows. Therefore it is necessary to have some more or less elaborate method of tracing them from one position to another. An excellent system is that which attaches to each transformer a number which indicates the capacity and whether it is single-phase or three-phase. The first two or three digits of the number will serve to indicate the size, and the rest of the serial may be used to give any further information that may be desired. Thus transformer number 7503 would be a 7½-kva. transformer, while 75003 would be a 75-kva. transformer.

There should be a card file with a card or filing envelope for each transformer, filed by number and bearing all the name-plate data and any other information that may be found needed. Besides this there should be a cross index with a card for each transformer bearing both the "company number" and the manufacturer's serial number and filed by manufacturer's serial number. This file has proved to be very useful in finding lost transformers. While transformer location may be kept on cards the same as the other two files, and arranged alphabetically by street names, it is better to use the line maps for this purpose. This helps to condense the records, which is very desirable.

Meter records may be handled in much the same way as that mentioned above.

There are innumerable details that may be added to a system of line records as the need for them arises, but if the proper foundation system has been provided, these details will fall naturally into place.

CONSTRUCTION RECORDS

A simple and efficient work-order system is of great value in keeping accurate records. It would be impossible to get changes on the line maps if all work done were not reported in detail. A good work-order system will provide for this.

It is rather common practice to separate the simple meter and service installations from the general construction work by providing a separate form to serve as an order for this work. The procedure in installing services is about the same in each case, and therefore estimates are seldom necessary except in the case of underground services. For this reason simple service drops and meter sets may pass directly from the new-business department to the department doing the work.

Where an extension is required to give service to a new customer the matter is not so simple. The extension may be one span or it may be ten spans. It may be possible to take care of the new customer by extending the secondaries, or it may be necessary to extend the primary lines, change a transformer and rearrange the secondaries. Furthermore, the request for an order to make line extensions or other line changes may not originate in the new-business department, but may be made necessary by the gradual growth of the load and overloading of certain sections of the distribution system.

Along with the latter type of work is the installing of underground cable, mains for the steam heating or water systems, customers' substations and any other construction work that the company may be called upon

to do. All of this work requires a little more elaborate system of records to keep track of it.

If several people were allowed to issue orders for work to be done, it would be very difficult to keep a record of these orders, and so it is better to have all orders issued by a work-order clerk. The orders should be numbered consecutively and should be issued only on written request and after the necessary approval. Oral orders lead to all sorts of mistakes and misunderstandings, and there is no way to fix responsibility for work done under such orders.

Work orders should be made out in multiple form so that a copy can be forwarded to each man who must handle the work, and one copy can be kept by the work-order clerk for a tracer. When the work is completed the man doing the work should mark the date completed and any other necessary data on the copy of the order which he holds and return it to the work-order clerk to be filed. These files are then available for any purpose for which they may be needed. For instance, if all time spent on the work were recorded on the order and all material requisitions attached, the file would then contain complete information for finding costs on all jobs handled. This is a handy way of finding the cost of work for which the consumer is to be billed.

In the foregoing discussion no effort has been made to describe a complete record system or to show sample forms for keeping records. When it is determined what records are to be obtained and how to go about getting them, it is not difficult to devise forms for keeping the data.

There is no intention of giving the impression that the methods of getting data given in this article are original with the author. They are only an accumulation of what seemed to be the best methods in this line of work that have come under his observation.

For and Against Synchronous Motors

Four Objections That Have Frequently Been Made to Using Synchronous Motors, with a Discussion Showing How Conditions Have Changed—Synchronous Motors and Unity Power Factor

BY WILL BROWN

THE synchronous motor has always been supposed to have certain drawbacks which limited its application for industrial drive. First among them was low starting torque. Second, since a synchronous motor runs at a fixed speed (the direct-current field of the rotor is locked to the alternating-current field of the stator) no slip is allowed; therefore the flywheel effect was supposed to be limited. Complication due to the separate exciter has also been cited. A fourth objection is sometimes made, viz., that synchronous motors require more careful attention and more skilled operators than other kinds. In order to determine the advisability of installing synchronous motors these four objections must be considered in turn and the question decided in view of the facts. This is the purpose of this article.

THE STARTING TORQUE

It is necessary to make a distinction between a synchronous motor's operation during the starting period up to the point of pull-in and its operation after synchronism has been attained. The critical point in starting a synchronous motor is the pull-in. Like a squirrel-cage motor, it starts and increases speed up to a certain point, known as its rated slip speed. This slip-speed rating varies according to the load. At this point of maximum speed as an induction motor a synchronizing torque must be exerted to pull the rotor field up into step with the rotating field of the stator. This operation may be compared to paralleling an alternator on the line. All operators have observed the large synchronizing power which is exerted as the incoming alternator approaches the frequency of the line. It is the same thing with the synchronous motor. The line current might be considered as gripping the field of the rotor and yanking it up into step.

It can be readily understood that the more slip there is in the rotor speed at the pull-in point the greater must be the torque exerted to pull the rotor up to full speed. It is possible to increase the initial starting torque by increasing the resistance in the damper bar windings, but this results in a larger slip or lower speed at the pull-in point. Therefore the limit of load which can be "pulled in" at a specified kva. input determines the starting torque. The future will doubtless see a considerable improvement in this pull-in characteristic of synchronous motors. By proper design it may be possible to change the pull-in peak current so that the same work can be done by lower current input over a longer space of time. Synchronous motors can now be designed to start and pull into step a load amounting to from 30 to 50 per cent of full load with a kva. input not to exceed 25 per cent of normal rating. It is probable that the time will come when the synchronous motor can be made to start and pull in its full rated load with a kva. input which will not exceed safe operating limits.

USE OF CLUTCHES

When the starting duty is so severe that a synchronous motor cannot handle it—on heavy line shafts, for instance—the solution may be found by the proper use of clutches. There are two types of clutches used, viz., mechanical and magnetic. The cost of a magnetic clutch is higher, but it has a number of points of superiority for certain types of duty, such as automatic safety control, etc. The variation of the grip on the clutch faces allowed by magnetic control can often be used to good advantage.

Among certain industrial plant operators of the old school there has been a widespread prejudice against the use of clutches. Their favorite remark was: "Oh,

I wouldn't bother with a clutch. . get a slip-ring motor big enough to start the load and that's all I care about."

It is true that they could do this very thing in the past, but it is equaly true that they are not going to be able to continue doing so. Central stations supplying power to these kinds of motors on this kind of drive

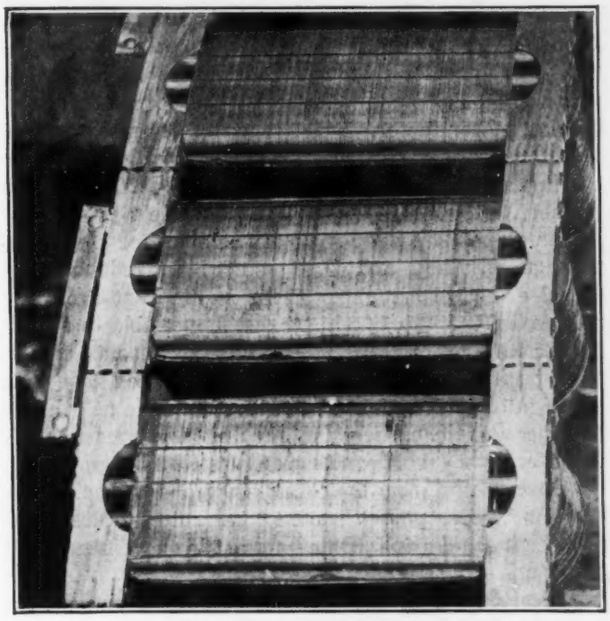


FIG. 1—SQUIRREL CAGE ON SYNCHRONOUS-MOTOR ROTOR TO GIVE HIGH STARTING TORQUE

have learned a lesson. They are going to demand high power factor, and the use of large synchronous motors for driving line shafts is one solution. Proper clutch installations will take care of severe starting duty.

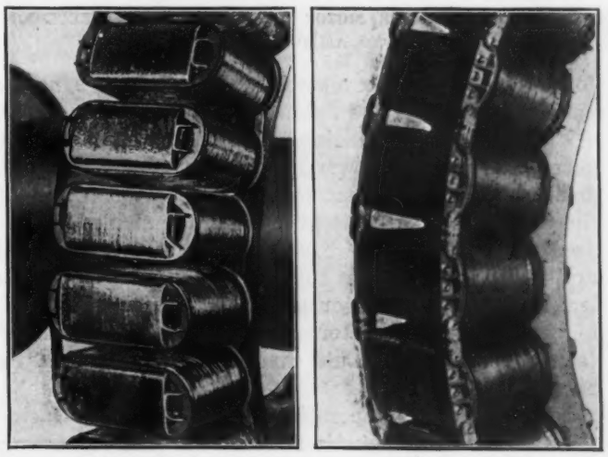
The Northern States Power Company, at Minneapolis, has a number of flour-mill loads, many of them driven by slip-ring motors. There have also been quite a few installations of synchronous motors belted or directly coupled to the line shafts. According to their experience, the synchronous motors are superior to the induction motor for this service. They have proved more satisfactory to the power user in point of efficiency and to the power company in point of power factor. The above company has recently ruled that it will allow nothing but synchronous motors on loads of this kind above 100 hp.

The clutch problem, after all, is not the bugbear that many operators think it is. Trouble in the past has often been due to the fact that too small a clutch was installed. It was not always the buyer's fault either. Many clutches were overrated by the manufacturers. The buyer would select a clutch too small and then his troubles would begin—clutch linings would burn out and necessitate shut-downs. The result was that the plant owner would condemn all clutches. With the selection of a clutch of proper size to allow sufficient margin for all conditions of starting and running there should be no trouble. Most assuredly it will pay engineers to investigate this subject of clutches from an impartial standpoint. At the present time clutch manufacturers are very willing to make the necessary engineering investigations and recommend the proper size amply to take care of the load.

Those who have studied the present performance of synchronous motors must admit that while low starting torque has been one of the chief objections in the past, motors as now designed are able to carry a wide variety of loads without trouble. A still greater improvement in starting characteristics is likely to further widen the application of such motors for industrial drive.

The subject of flywheel effect required for synchronous motor drive is too technical to discuss in an article of this kind. Synchronous motors as now designed with normal excitation can stand instantaneous overloads of several hundred per cent. In fact, the pull-out point of a synchronous motor can be made so high that it is far beyond the heating limits of the machine. It is true that the synchronous motor does not allow the flywheel to act over a definite slip period as does the induction motor. There is, however, a certain amount of "give" between the direct-current field and the alternating-current field on the synchronous motor as the load increases instantaneously. That is, the rotor can slide back a portion of a pole face, and during this brief interval the flywheel is allowed to act. This helps considerably in taking care of the sudden jolts of the load such as those at the end of the stroke on compressors and other reciprocating machines.

On certain heavy, fluctuating loads it is possible to use a magnetic clutch with the magnetic pull on the clutch lining set to allow slippage at a certain maximum load. When the load exceeds this there will be a slip between the two halves of clutch, and the flywheel can carry part of the load. An interesting example of such an installation may be seen at the Trap Rock plant, Dresser Junction, Wis. A single line shaft is driven by a 600-hp., 200-r.p.m. synchronous motor. From this line shaft several crushers and other machinery are driven by ropes or belts. There is one large jaw crusher capable of receiving a full carload of rock in the hopper. Two large flywheels, approximately 16 ft. (4.8 m.) in



FIGS. 2 AND 3—ROTORS OF SYNCHRONOUS ALTERNATOR AND MOTOR

Note that there is comparatively more space between pole tips on the alternator than on the synchronous motor which is designed for unity-power-factor operation. The extra space is necessary to minimize field leakage at low power factor.

diameter, weighing from 15 tons to 20 tons each, are set on each side of the crusher. When the heavy peak comes on the crusher the magnetic clutch slips, allowing the flywheels to help carry the load.

The third objection, previously mentioned, namely,

the complications due to a separate exciter, is not a very serious one and is much more than offset by the advantage that synchronous motors can supply the necessary magnetizing kva. for induction motors to counteract the lagging power factor they produce. Very little trouble or inconvenience arises from the separate excitation since it involves no more complication than there is in the exciter circuit of any direct-current motor.

SYNCHRONOUS MOTORS FOR UNITY-POWER-FACTOR OPERATION

Motors which are to drive mechanical loads at the highest efficiency should be operated as nearly as possible at unity power factor. Motors operated in this manner constitute a non-inductive load, and while they do not operate at leading power factor, except at infrequent intervals, they do help the power factor of a line to a limited extent.

The design and construction of synchronous motors

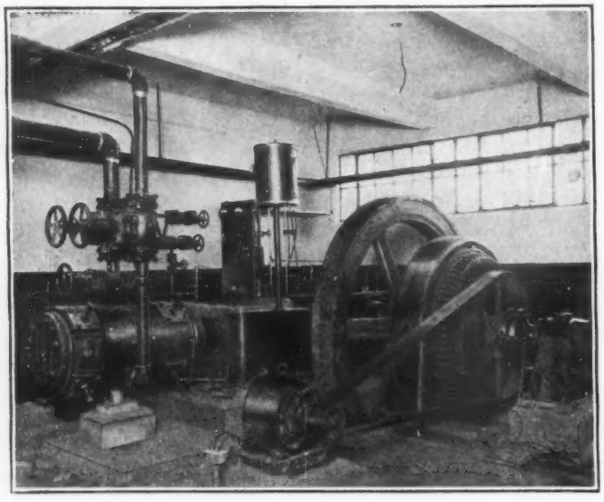


FIG. 4—SYNCHRONOUS MOTOR WITH FLYWHEEL DIRECT-CONNECTED TO AMMONIA COMPRESSOR

for unity-power-factor operation differs from synchronous condensers in the following respects:

First—The field winding need not carry so large a current for unity-power-factor operation, therefore field copper is somewhat reduced. Also the rating of the exciter is reduced to about half the size of exciter used for a condenser. Since the field current is thus limited, it is impossible for the motor to operate at a low leading power factor anywhere near its kva. rating at unity power factor. At very low leading power factor such a motor could carry less than one half its normal kva.

When a motor is operating at leading power factor the field is overmagnetized from an exterior source of magnetization, in this case the direct-current exciter. When the motor is running at lagging power factor the field is magnetized from the alternating-current side. Since this magnetizing current is in quadrature with the voltage, it has zero power factor and produces no heating effect in the field. This explains why the field heating in a synchronous motor is high at leading power factor and low at lagging power factor.

Second—Among the differences between a synchronous motor designed for unity-power-factor operation and one designed for power-factor correction is that no rheostat is necessary for controlling the field of the synchronous motor of the first type. This eliminates rheostat losses and helps efficiency to a slight extent.

Third—It has often been said that a synchronous motor is merely an alternator supplied with damper windings on the pole faces. This is not quite correct. In any alternator the shape of the pole tip as well as the extent of the pole span is limited by the field leakage which the poles must withstand when operating at low lagging power factor. Since it is not necessary to provide for such a condition with a synchronous motor operating at unity or slightly leading power factor, it is possible to design the pole faces and pole tips so as to get much better distribution of the slots for the squirrel-cage winding, and thus succeed in reducing the actual electrical air gap. (This is different from the mechanical air gap.) This makes it possible to reduce the amount of excitation necessary to produce a certain specified pull-out torque. It can be seen that such a design of pole construction will reduce the field losses and increase the efficiency of the unit as compared with the alternator (shorter pole span) type of design. Manufacturers who use the same design for their synchronous motor poles that they use for the alternator poles cannot take full advantage of the above-mentioned opportunities.

A synchronous motor designed to operate at full-load unity power factor will be from 10 to 25 per cent lower in price than a synchronous motor designed to operate at low leading power factors. This comparison is based on prices including exciter in both cases.

ATTENTION REQUIRED

The fourth objection, that synchronous motors require more careful attention and more skilled operators than induction motors, is less important to-day than it was a few years ago. Most operators who are capable of handling induction motors of larger sizes can easily learn to start and operate synchronous machines. In the past the manual operation of starting a synchronous motor was often done in rather a crude and unscientific manner. Starting has now been simplified to such an extent that any careful operator can start a synchronous motor without mistake. It seems quite likely that automatic starting devices will ultimately be installed for synchronous motors which will guarantee at all times the most efficient starting, regardless of the skill of the operator.

After the motor is running at synchronous speed there is very little likelihood of "hunting" any more. Whenever such action arises it is generally due to faulty engineering in the installation. Commutator trouble in the exciter is not nearly so likely to arise on a synchronous motor operating at unity power factor as would be the case on an alternator where the power factor of the line is varying. Besides, exciters, as now designed, give comparatively very little trouble.

After facing all the practical objections which can be made to synchronous motors we must admit that the advantages more than offset the handicaps—on heavy loads of constant speed. With ordinary intelligent handling they operate satisfactorily with very low maintenance cost.

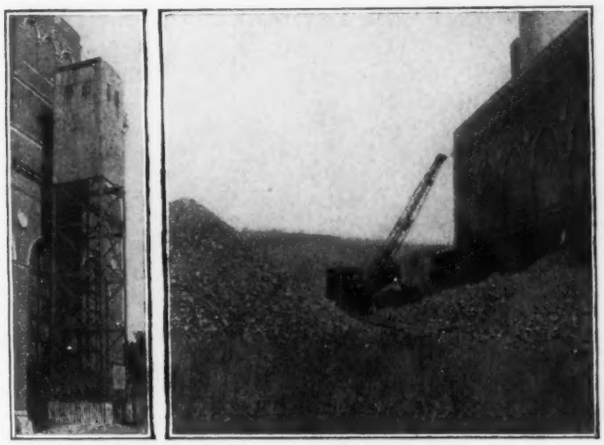
STATION & OPERATING PRACTICE

A Department Devoted to Problems of Installation, Operation and Maintenance of Equipment for Economical Generation and Distribution of Electrical Energy

ECONOMICAL METHOD OF HANDLING COAL AND ASHES

System Used in New York Plant Has Advantage of Affording Ground Storage for Coal Until Handled by Crusher

In these times, when coal is difficult to obtain, the adaptability of the coal-handling apparatus to existing conditions should not be overlooked. The plant of the Elmira (N. Y.) Water, Light & Railroad Company was very well designed and proved very effective under ordinary conditions, but now that coal must be stored in the summer to prepare for the months when only a small amount of it can be obtained some method had to be devised whereby the coal could be stored



ASH HOIST AND COAL-HANDLING CRANE TRANSFERRING COAL FROM STORAGE TO CRUSHER

until the crusher could take care of it. The accompanying illustration shows the method used in handling the incoming coal, which is ordinarily dropped from the coal cars through the tracks and directly to the intake of the crusher. When this intake bin fills up coal is dropped further along the track and is there picked up by means of a locomotive crane running on a track parallel to the main railroad track. This crane stores the coal in large piles. From time to time as the crusher comes into operation the coal from storage is handled to the bin by means of the crane.

After being crushed, the coal is run into a Meade-Robinson skip hoist which is manually controlled and delivers it to the top of the power plant. The coal drops into a bucket and travels above the overhead storage bins, and when released by the man stationed at the top of the bunker it travels by gravity along the bin until it is tripped and emptied. The reaction on the car when it hits the trip sends it back to its original place.

Tracks built underneath the ash receivers of the boilers run to a central point at the door of the power plant. These cars can be pushed out by two men. At present the ashes are taken out and dumped on the river bank, which is low. In the future, however, when it is desired to haul the ashes away, the hoist, as shown, can be used for raising the ash car, and it then can be dumped into a railroad car brought to the bottom of the hoist.

The operators of this plant think that the skip hoist is ideal for a small plant. Its cost and maintenance are very small, and the entire coal passing from car to overhead storage requires only one man for the crusher, one for the skip hoist and one on top of the plant, making a total of three men to operate the coal-handling system. The operation of this hoist is easy, and repairs can be made without difficulty. It is large enough to handle all coal as fast as the crusher can deliver it. The cost of the entire handling from car to the storage bin has been estimated as 15 cents per ton.

What Lessons in Economy Have You Learned?

A REQUEST has been received from the United States Fuel Administration asking our coöperation in a concerted effort to effect still greater fuel conservation. While the ELECTRICAL WORLD has been championing this cause right along, we want to answer the administration's request with stronger and more original articles than ever. You can help by contributing something on your observations and experiences in coal conservation.

Attention should be directed to immediate and practicable means of conservation. To be of greatest service in this campaign information should be applicable to central-station engineers, consulting engineers, industrial-plant electrical engineers and those with similar interests. Subjects relating to economies from the coal pile to the motor driving industrial-plant equipment are interesting.

Specific information is preferred. In other words, refer to definite cases that have come to your attention; outline the conditions involved, relate how the problem was solved, what results were obtained, and what conclusions were reached from your investigations.

While the war is over, we still have to economize as much as, if not more than, ever, because there may be tendencies to stop saving since the patriotic incentive that existed during the war is, unfortunately, not so dominant now. Failure to observe the lessons in economy learned during the war and relaxation in efforts to extend economies would be a serious mistake.

ASPHALT PAVEMENT INCREASES TEMPERATURE OF CABLES

Prevents Moisture from Penetrating the Soil and Thus Helping to Conduct Away the Heat Generated in the Ducts

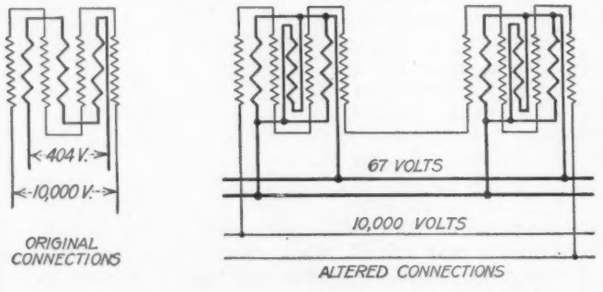
A peculiar case arose recently where a customer lost several cables through burn-outs within a short time, without any apparent reason. Further investigation brought out the fact that the street had been but recently covered with asphalt pavement. On taking up the pavement it was found that the sand soil around the duct structure was absolutely dry from the excessive heat, the layer of asphalt having prevented the water from entering and cooling the soil around the ducts. This case emphasizes the old engineering truth that in a complex phenomenon or structure it is not safe to introduce a new factor, no matter how remote or insignificant its effect upon the desired performance may seem.

EMERGENCY SERVICE FOR ALLOY-STEEL COMPANY

Rotary-Converter Transformer Reconnected to Give Desired Voltage as Special Transformers Were Not Available

Having a request for service from a ferro-alloy steel products company and being unable to secure transformers of the desired voltage in less than eight to nine months, the Portland (Ore.) Railway, Light & Power Company employed the connections shown in the accompanying illustration.

Two single-phase air-blast 10,000/404-volt transformers were employed, each of which originally had three secondary coils and four primary coils in series. The primary coils were left as they were originally connected, and those of each transformer were joined in series across a 10,000-volt supply. The secondary coils, however, were reconnected as shown, and the transformers were joined in multiple on the secondary side. With these connections the desired secondary voltage (67 volts) was obtained. As far as the transformers were concerned the operation was satisfactory,



TRANSFORMER CONNECTIONS FOR SERVING FURNACE LOAD

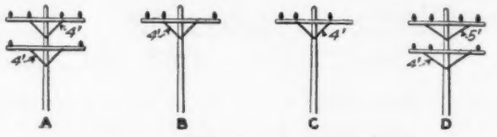
but the method of operation had to be abandoned later on account of trouble with the furnace electrodes.

This was a temporary connection inasmuch as the transformers were borrowed from a rotary-converter station to which they have been returned since this emergency service was furnished. C. P. Osborne is superintendent of light and power for the Portland Electric Service Company.

USING BRACES ONCE CONDEMNED

Scheme Which Relieves Trouble and Permits Company to Get Full Value from Stock on Hand

A Middle Western central-station company which has standardized on the type of construction illustrated in sketches A and B had trouble when the proximity of a tree or other obstruction caused linemen to set the



BRACES NEAR PINS CAUSE BURNING

third wire over as in sketch C. The clearance between the steel pin and the 4-ft. (1.2-m.) steel brace was only about 0.25 in. (6 mm.), and this led to trouble from current flowing from phase to phase. In some cases the line was burned down.

It was obviously possible to cure the trouble by using a longer brace. But the company had on hand a large number of 4-ft. braces which had cost about $1.15 each and naturally did not want to scrap them. Consequently it was decided that on all top arms a 5-ft. (1.5-m.) brace should be used, as in sketch D, and on bottom arms the old 4-ft. braces should be employed (D). Some exceptions to this rule were made where there was no possibility of pin No. 3 on the top arm ever coming into use. In such places the old 4-ft. braces were used.

CEMENT FIREPROOFING FOR CABLES

Cost Is About the Same as for Asbestos, but Construction Stands External Heat Better

From the actual experience of cables fireproofed with cement and asbestos the Cleveland (Ohio) Illuminating Company has found that the cement covering is unaffected by a burn-out in a manhole, whereas the asbestos covering sometimes proves ineffectual. Cables have failed in manholes in which these two types of protection were present, and on investigation the cable covered with asbestos has been found severely burned whereas the cement-covered cable was practically undamaged. The burn-outs have been caused by a short-circuit of 500,000 kw. on 6-in. (15-cm.) cable.

The company has found that this method of fireproofing is as cheap as the asbestos method, if not more economical. It will average about 15 cents or 20 cents per linear foot when used for covering 4-in. (10-cm.) cables. The covering consists of ½-in. (13-mm.) cement, mixed in a ratio of one to three with sand formed by wrapping a 3-in. (76-mm.) wide cheesecloth in a spiral covering. It also is said that the fireproofing ability is two to one in favor of cement on account of the larger radiating surface.

When it is required to remove the covering from the cable it is easily chipped off by means of a light blow with a hammer. The labor cost is somewhat greater for the cement than when installing asbestos coverings, but this is compensated for by the increased cost of the asbestos. The Cleveland company is adopting this method of covering whenever an open run of cable is required.

CENTRAL STATION SERVICE

A Department Devoted to Commercial Policy and Management Topics, Including Applications of Electric Light, Power and Heat

APPLIANCE LINE BROADENED IN CITY OF NEW ORLEANS

Coffee Roasters, Meat Choppers, Fuses, Etc., to Be Featured in Order to Keep Selling Force Together and Build up Profits

Interesting steps are being taken by W. E. Clement, commercial manager of the New Orleans (La.) Railway & Light Company, to increase the scope of the merchandise sold to the company in order to increase both the market opportunity and the profit. He believes that it is far better to broaden the line and build up profits in order to keep pace with the higher costs of doing business rather than to cut down the selling force too far and lose "steerage way." Therefore, in addition to the regular merchandise which has been on display and sale, arrangements have been made to sell electrically driven coffee roasters, meat choppers, domestic ventilating fans, ceiling fans, bell transformers and a number of other appliances for which it is believed a good demand can be created.

All these devices are adaptable to the company's selling methods, and, being kindred lines, it is felt that they can be handled well by electrical salesmen. As a matter of convenience for the public, a full line of fuses of both plug and cartridge type are being featured in the store and will be sold at a good profit. As a result the New Orleans sales department expects to find ample opportunity to justify a very active selling campaign this year, with sufficient profit assured to make it possible to do good creative work in market development.

EFFECT OF THE WAR ON REVENUE FROM LIGHTING

Maine Central Station Seeks Rate for Period of Emergency Revision Upward to Offset the Heavy Increases in Cost

The York County Power Company, affiliated with the Cumberland County Power & Light Company, Portland, Me., recently prepared a revised schedule of commercial and seasonal lighting rates in which the effect of the war upon costs was strongly reflected. The company proposes to advance the price of energy (maximum retail) from 9¼ cents to 11 cents per kilowatt-hour. The existing seasonal rate E of the company provides in part that "a customer may use in one or more of the months of November, December, January and February at 5 cents per kilowatt-hour an aggregate amount of energy up to, but not in excess of, the aggregate amount used by him at 15 cents per kilowatt-hour in any or all the months of June, July, August and September."

The proposed schedule contemplates advancing the rate charged for all energy except that used during the summer months, quoted at 15 cents per kilowatt-hour, and the compensating amount at 5 cents per kilowatt-hour during the four winter months. The company will fulfill its contract with customers served under lighting rate E during the past summer. For the excess energy used in the winter months over that used in the summer months the charge will be at the rate of 11 cents instead of the 10 cents called for by the old rate.

The lighting revenues for the year ended Sept. 30, 1918, were less by $4,554 than for the preceding year. This is attributed to the daylight-saving plan and to a reduction made in the seasonal lighting rate by order of the Maine Public Utilities Commission.

A comparative statement of the results of the operations of the light and power department for the twelve months ended Sept. 30, 1918, is as follows:

	1917–1918	1916–1917	Increase
Gross revenue	$261,979.79	$253,637.92	$8,341.87
Operating expenses	138,800.98	132,562.45	6,238.53
Net operating revenue	$123,178.91	$121,075.47	$2,103.34

No fixed charges are included in the above figures. The lighting revenue for this period is as follows:

	1917–1918	1916–1917	Decrease
Lighting revenue	$145,099.99	$149,654.68	$4,554.69

In accordance with the clause previously mentioned under lighting rate E, the company during the months of November, December, January and February will have to refund to its year-around customers about $2,423. This amount is included in the above lighting revenue, so that the actual decrease is $2,423 more than the $4,554.69, or $6,977.69. The $2,423 represents the "aggregate amount of energy used" by the year-around customers during the months of June, July, August and September and is the amount of energy these customers are entitled to during the months of November, December, January and February at 5 cents per kilowatt-hour.

Upon May 1, 1918, the rates of wages in the lighting department were advanced about 12.5 per cent. On Oct. 1, 1918, another advance in rates of pay equivalent to about $4,400 per year was made.

The taxes for the year ended Sept. 30, 1918, are $10,456.64, an increase of $4,756.64 over the corresponding period of 1917. The 1919 taxes will doubtless exceed the 1918 taxes by about the same amount.

It is estimated that the proposed increased lighting rate will add $12,600 per year to the revenues of the company, $11,100 of which will come from the regular commercial lighting rate. This the company believes to be a most reasonable added charge to insure adequate and continued good service. "To avoid a loss in the electric department good service demands that remedies be applied in time to prevent deficits from occurring

with their accompanying impairment of service. The company's entire interest—even its selfish interest—is to give good service. Protection of the credit of the company assures permanent good service," the company stated at a hearing Oct. 31 at Bridgeford.

The company asks that these rate schedules be considered as temporary, that they become effective forthwith, and that they apply for the period of the emergency. In the view of the company this proceeding today is not the usual proceeding of a rate based on valuation, but is an application for immediate relief because of the extraordinary conditions now existing. No prospect for the improvement of these conditions is yet apparent.

The company believes that the lighting department will have to meet further increased operating costs in addition to those already mentioned. Just what these costs will be cannot be stated, but experience shows that an adequate margin is required to meet unforeseen expenses and contingencies. In order to have funds available for such purposes and to prevent financial loss, the company asks that the proposed lighting rates be allowed to become effective forthwith as an emergency measure. At the above hearing before the Maine Public Utilities Commission there was no opposition to the proposed increase.

RETURN TO NORMAL DAYLIGHT INCREASES STATION LOAD

At Boston the Demand, Part of Which Was Due to Street-Lighting Service, Increased by About 15,000 Kw.

A comparison of the peak loads on the system of the Edison Electric Illuminating Company of Boston before the daylight-saving program was abandoned and afterward showed that the recent change in time was accompanied by an increase of about 15,000 kw. in the demand upon the generating plant. Part of this increase was due to the street-lighting service.

TURNING AN EXPENSE INTO A SOURCE OF PROFIT

By Selling Lamp Boxes and Fuses, Salvaging Repair Parts and Inducing Customers to Buy Lamps in Carton Quantities Savings Are Made

The Little Rock (Ark.) Railway & Electric Company is not a large property, and its savings through measures of economy consequently do not bulk very high. However, it has learned to turn what was formerly an expense into a profit, making thereby a double gain.

Incandescent lamp boxes are now an asset instead of being a liability. Lamps are unpacked once a week. Formerly a wagon hauled the empty boxes to a dump at a cost of 50 cents per trip. This cost the company $26 a year. Now these boxes, instead of being destroyed, are sold at 15 cents each, giving an annual income of $78—total saving $104.

Fuse plugs to the number of 520 annually were formerly given away. These cost 2 cents each, making an expense of $10.40. Now they are sold at a profit of $25, making a total saving of $35.40.

Lamp sales show a saving which is hard to estimate. Now ninety out of every hundred customers readily agree to take a carton of five lamps instead of purchasing lamps one or two at a time. The customers, according to R. I. Brown, commercial manager, seem to continue thereafter to purchase carton quantities.

Scrap metal formerly hauled away with other trash, at a negligible cost, now returns to the company about $25 annually from the salvage of repair parts.

GRAPHICAL METHOD OF MAKING FINANCIAL STATEMENTS

Manager of a Middle Western Utility Uses This Plan as a Spur to Keep the Gross Income Above the Operating Expenses

In order to present the factors contained in his monthly report in a graphical form, the manager of the electric utility in Rice Lake, Wis., a town of about 5000 population, plots the results on cross-section paper. This permits him to compare easily the results for successive

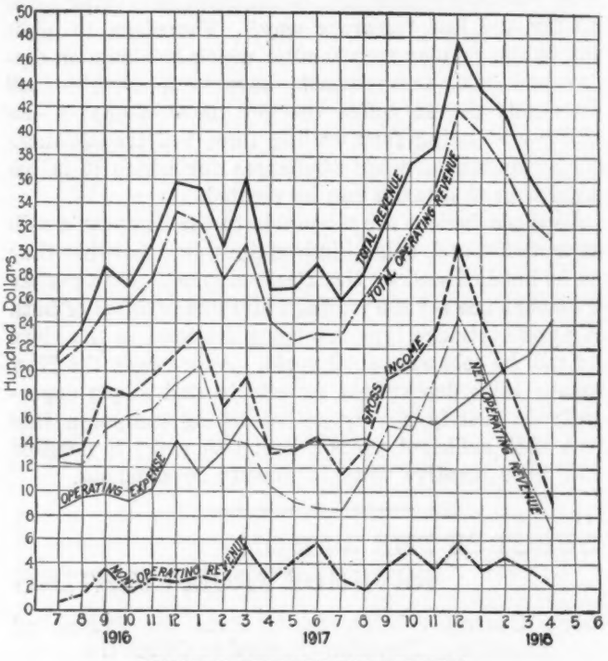


CHART OF REVENUE AND EXPENSE

years and to see at a glance the trend of the various factors. A study of the curves shows that during the fiscal year 1916-1917 the maximum total revenue for any month was obtained in March and the maximum gross revenue was obtained in January, while for the year 1917-1918 the maximum total revenue and gross income were both obtained in December with a rapid decrease in both factors for the months following that date.

There has been a steady increase in the operating expense curve since November. If the factors follow the present tendency, it is evident that an increase in rates will have to be obtained.

The manager not only uses this set of curves as an indication of conditions but as a spur for himself, as he endeavors to keep the gross income well above the operating expense.

TECHNICAL THEORY & PRACTICE

Including a Digest of Important Articles Appearing in the Scientific and Engineering Press of the World

Generators, Motors and Transformers

Short Circuits in High-Tension Machines.—Discussion upon the conditions of heating of the relay coils of circuit breakers in case of short circuit in the circuits which they protect.—*Revue Générale de l'Electricité*, Sept. 7, 1918. (Abstracted from *Elektrot. Zeit.*, May 16, 1918.)

Accidents to Turbo-Alternators.—P. BOUCHEROT.—A sub-committee of the Union des Syndicats de l'Electricité was appointed to consider how to reduce, if not to abolish, these accidents and divided its investigation into three parts: (1) Improvements in construction of turbo-alternators; (2) eventual modifications in the conditions of their installation; (3) proper measures to limit the damage when accidents occur. The report dwells on the necessity of paying more importance to overheating than has hitherto been done and makes suggestions to this end both as regards the construction of the turbo-alternators and as regards their setting up and connection. American practice is quoted approvingly.—*Revue Générale de l'Electricité*, Sept. 28, 1918.

Current Distribution in Three-Phase Commutator Armatures.—M. ERNST.—The heat generated in a three-phase armature with six-brush studs is zero with the brushes in the no-load position. If half of the brushes are shifted, the copper losses increase. Diagrams are drawn showing how the currents in the different armature conductors vary as the brushes are shifted, and it is shown that if the current supply is constant, the copper losses increase proportionally to the displacement of the brushes until this becomes 120 deg.; from here onward the copper losses remain constant until the short-circuit position is reached. The first investigation refers to diametrical windings and the second to chord windings. Practical conclusions are drawn as to the best position for the brushes for normal running. They are usually set at an angle of 120 deg. This is just the point at which the copper losses begin to decrease with decrease of the brush angle, and it might be considered desirable to work with smaller brush angles in consequence. It must, however, be remembered that as the angle is decreased the power factor is diminished. On the other hand, the angle might be increased without augmenting the copper losses, but an increase of the angle above 120 deg. has the effect of diminishing the overload capacity of a motor at a given speed.—*Science Abstracts, Section B*, Aug. 31, 1918. (Abstracted from *Elekt. Zeits.*, 39, May 9, 1918.)

Lamps and Lighting

Street Lighting.—G. L. THOMPSON.—The author discusses the street-lighting problem from the viewpoint of the manufacturer, the central station and the municipality. He shows that the rate of increase of improvement in lighting is not likely to be so great in the future as in the past. Therefore the changes necessary to secure the latest type and highest efficiency will be less frequent. He states the difficulties confronting the lighting committees, reviews the advantages of large individual lighting units and summarizes some of the most important points to be considered in the lighting of business centers, intermediate sections and outlying districts of municipalities.—*General Electric Review*, October, 1918.

Apparatus for the Determination of the Luminous Intensity of Lamps in All Directions.—J. SAHULKA.—This installation is composed of a vertical ring supporting a number of small plaster disks at an angle of 45 deg. with the axis of the ring and so placed as to mark in rotation horizontal zones of equal height upon the sphere made by the ring. The lamp under test, placed in the center of the circle, can be turned around its vertical axis. The ring is normally placed on a photometric bench. A screen prevents the light from the lamp striking the photometer directly, which receives only the light reflected by the plaster disks. In order to measure the hemispherical luminous intensity half the disks are hidden. A single measurement thus suffices to give the mean intensity in any plane. By turning the lamp it is obtained in all the other planes. The mean of the measurements gives the true mean spherical intensity. The reading must, of course, be multiplied by a coefficient pertaining to the apparatus, since only a fraction of the light of the lamp is reflected toward the photometer. In the apparatus described this coefficient is about 20.—*Revue Générale de l'Electricité*, Sept. 7, 1918. (Abstracted from *Elektrot. Zeits.*, June 27, 1918.)

Office Lighting.—WARD HARRISON and J. R. COLVILLE.—The authors stated that the problem of office lighting was fundamentally one of providing the best illumination for the sustained vision of flat surfaces in horizontal or slightly oblique planes as contrasted with lighting for the perception of objects in their three dimensions, so important in the industries and the arts. Illumination intensities of 4 to 8 ft.-candles were mentioned for offices and of 8 to 12 ft.-candles for drafting rooms. The use of daylight lamps was suggested in offices where daylight must be supplemented by artificial light during a considerable portion of the time. Emphasis was placed upon the desirability of low ratios of brightness between visible light sources and their surroundings. Direct, semi-inclosing, semi-indirect and indirect units were classified as to their relative desirability from the standpoints of glare, specular reflection and shadow. The proper field for each type of unit was taken up. Coefficients of utilization for the various equipments and proper spacing ratios were included. The use of individual lamps in lighting offices was discussed.—*Transactions I. E. S.*, Oct. 10, 1918.

Generation, Transmission and Distribution

Waterwheel Types and Settings.—DAVID R. SHEARER.—Various forms of waterwheels and turbines are described with regard to the direction of flow of the water, the position of the shaft and the casing of the wheel. These types of wheels are all illustrated.—*Power*, Nov. 5, 1918.

Care of Heating and Ventilating Equipment.—HAROLD L. ALT.—In this paper, third installment of the series, the author treats of the proper firing of heating-plant boilers. Smokeless combustion is shown to be the most efficient combusion, and devices for preventing smoke are described.—*Power*, Nov. 5, 1918.

Conservation of Heat Losses from Pipes and Boilers.—GLEN D. BAGLEY.—The purpose of this paper as stated by the author is to present a more complete and detailed method of solving problems involved in the calculation of the heat losses from bare and covered pipes and the economic problems encountered in the practical application of coverings. Curves showing the heat losses from bare and covered pipes as functions of the temperature of the pipes are presented. He also shows by means of a curve that the absolute conductivity of magnesia covering depends on the temperature difference. The effect of cooling air currents on pipe coverings is also discussed. Curves are presented to show the initial cost of pipe coverings for various sizes of pipes and varying thickness of covering. The economical thickness of heat insulations for various sizes of pipes is also shown in the form of curves. The writer gives some very useful data showing the saving in the monthly coal bill by the use of 85 per cent magnesia pipe covering of standard thickness for various sizes of pipes per 100 ft. (30 m.) of pipe. There is also some discussion of the permanency of insulating coverings and the selection of coverings to give the lowest operating expense.—*Journal A. S. M. E.*, November, 1918.

Utilization of the Hydraulic Power of the Thur Region in Switzerland.—This proposed development concerns a territory of 1150 sq.km. where there are available water powers capable of supplying in winter time 20,000 kw. to a projected central station at Thur and 35,000 kw. to 40,000 kw. to another projected central station near Lake Constance. The author holds that the installations would pay for themselves in twenty years in coal saved.—*Revue Générale de l'Electricité*, Sept. 7, 1918. (Abstracted from *Schweizerische Bauzeitung*, June 22, 1918.)

Power: Its Significance and Needs.—C. G. GILBERT and J. E. POGUE.—It is recommended that the power situation in this country might be improved by the establishment of a comprehensive system of electric transmission lines to be administered much as are the railway systems. Such a system would encourage the coördinated growth of central power stations in coal fields and water-power sites, and would diminish the transportation of fuel and also make available electrical energy where this is now not commercially accessible.—*Bulletin Smithsonian Institution* (abstracted in *Science*, Oct. 4, 1918).

Electrolytic Corrosion in a Westinghouse-Leblanc Air Pump.— L. CONGE.—Investigating an instance of this kind in which chemical and galvanic corrosion has taken place, the author maintains that in mechanical construction where a pump or other organ must function in water however soft the employment of metals forming voltaic couples must be avoided; otherwise the rapid corrosion of the more electropositive metal is inevitable.—*Revue Générale de l'Électricité*, Oct. 12, 1918.

Maximum Bituminous Coal Prices.—A pamphlet has just been published by the United States Fuel Administration giving prices of bituminous coal for each state in the Union where coal is mined. Prices are f.o.b. cars at the mines and are given for each seam in every district. The coal prices include run of mine, prepared sizes and slack or screenings. These prices were effective Oct. 7, 1918.

Fuels of Canada.—B. F. HAANEL.—Canada's fuel problems are intimately related to those of our own country, for our northern neighbor imports 55 per cent of her coal and 98.5 per cent of her oil from the United States. Canada's coal resources are second only to our own as far as undeveloped reserves are concerned. The lignite field, which contains a large proportion of the coal reserves of the United States, extends into Canada, where it forms a much greater proportion of the Canadian coal reserves. The high-grade coal fields are much more limited in extent and occur only in the extreme eastern and western provinces. The further development of Canadian fuel resources will be a relief to both countries.—*General Electric Review*, October, 1918.

Efficiency in the Use of Oil Fuel.—J. M. WADSWORTH.—The pamphlet is intended as a handbook of information for the man intimately associated with the use of fuel oil. In 1917 there were 160,000,000 barrels of fuel oil burned in the United States. At a conservative estimate 40,000,000 barrels, or one-fourth of the total, might have been saved by more intelligent operation of plants and by proper firing. Therefore the users of oils are urged to take steps immediately to reduce their fuel consumption. The article gives extensive information on the subject, acknowledgment being given to Ernest H. Peabody, Babcock & Wilcox, Lionel S. Marks, William Kent and Henry Kreisinger, and William T. Ray of the Bureau of Mines. The subject is treated under the following divisions: Heat transmission, boiler and furnace design, steam and its properties, oil fuel and its properties, heating the oil, combustion of fuel, fluegas analysis, boiler efficiency, capacity and rating, auxiliary apparatus, publications on oil fuel, rates and specifications for the purchase of fuel oils. The article is well illustrated and contains many tables of a handbook character.—*Bureau of Mines*, August, 1918.

Installations, Systems and Appliances

High-Current Transformers for Electric Ovens.—R. JACQUOT.—An explanation of the radical variations in the price, output and voltage drop of transformers designed for electrometallurgy as affected by the conditions of operation imposed and the number of secondary voltages required. The author seeks to arrive at certain economic conditions capable of realization.—*Revue Générale de l'Electricité*, Oct. 12, 1918.

Time-Limit Induction Overload Relay.—F. E. JAQUAY.—The relay described in this article is built on the principle of the well-known induction-type meters. The contacts are closed by rotating elements supported by

jewel bearing and pivot. The relay is provided with a temperature-compensating device which causes it to function correctly with large variations of temperature, and provision is made for a wide range of adjustments for time delay and current values at which the overload relay will trip.—*General Electric Review*, October, 1918.

An Ideal Twenty-four-Hour Load.—S. G. GASSAWAY and W. G. TAYLOR.—The fuel-oil shortage now developing, which is analyzed by the authors in an interesting manner, brings to the front the fact that in the oil fields themselves an exceptionally large saving in oil can be obtained by electrification. Not only is the opportunity for the extension of electric power there a large one, but the load itself closely approaches the ideal sought by central stations, as the illustrations attest. The article will for this reason be of particular interest to central-station men.—*General Electric Review*, October, 1918.

Electrophysics and Magnetism

Specific Heat of Tungsten at Incandescent Temperatures.—PAUL FREDERICK GAEHR.—A scheme used and described by Worthing has been slightly altered by using a cyclic method. The chief advantage is a saving of time in making the measurements. Details have been worked out for making the method accurate. A second plan has been worked out, differing from Corbino's bridge method in two important details: (1) It is adapted to lamps with potential leads, and (2) the procedure is so modified as to simplify the measurements and calculations. The second method appears to render somewhat more consistent results, although, like the first method, differences in the specific heat appear when computed with increasing and decreasing temperatures, these differences being greater at the lower currents.—*Physical Review*, November, 1918.

Miscellaneous

Opportunity of Electrical Refrigeration.—H. N. SESSIONS.—(On account of two typographical errors which occurred in a digest of this article in the issue of Sept. 14, the paragraph is printed again as corrected.) The author suggests the possibilities of electrical refrigeration as one of the most extensive summer loads at the present time, with enormous opportunities for the future. The Southern California Edison Company is supplying electricity to one ice company alone using approximately 2000 hp. in motors to manufacture raw-water ice in connection with cold storage. Several of the large electrically operated ice plants show an average consumption for the year of less than 50 kw.-hr. per ton. The usual motor installation of an ice plant, including all auxiliaries, is approximately 3 hp. per ton of ice to be made each twenty-four hours. The average ice-plant load is one with an annual load factor above 80 per cent, a monthly load factor of 90 per cent, and by using synchronous motors the power factor may be kept close to unity. Advantages in the use of electricity in ice plants are that less labor is required for operating and that the fire hazard is also reduced. Owing to the fact that higher speed, and thus cheaper compressing machinery, may be used with electric drive, electricity is fast supplanting steam in this service.—*Journal of Electricity*, Aug. 1, 1918.

Utilizing Waste Heat and the Fuel Shortage.—A large untapped source of heat of which little use has been made hitherto, and which costs nothing, is to be found in the waste heat of internal-combustion engines, in which some 70 per cent of the total heat of combustion is carried off by the exhaust gases and water jackets. Although there are many hundred thousand gas and oil engines in the United Kingdom, the use of their waste heat has been confined to a very limited number of installations. Some details of a system which has been devised by F. A. Wilkinson of Hatfield, Hertfordshire, England, for heating his house in connection with his electric lighting plant will be of interest. In effect, the system comprises the connection of the exhaust piping, which is fitted with a patent silencing device, to lengths of pipes in the rooms in such a manner that the temperature can be regulated, while, in addition, a branch pipe is taken to the kitchen, heating a jacketed cooking range which is also fitted with electric heating elements. The piping from the water jacket of the engine is run to hot-water radiators and terminates in the bathroom. Electric radiators will absorb any surplus electrical energy that will be generated on very cold days.—London *Electrical Review*, Oct. 11, 1918.

Portable Automatic Trimming Conveyor.—It is said that up to the present time very little has been done for the mechanical filling and trimming of bunkers in loading coal on ships. The portable automatic trimming conveyor illustrated in this article has been designed for the purpose of handling coal with the minimum of labor, trimming it into all the bunkering spaces provided in mail and cargo steamers, reducing the cost and displacing the hand labor required in the present bunkering system.—*Electrical Times*, Sept. 19, 1918.

Scientific and Industrial Research.—In presenting the report for 1918 of its advisory council, the Committee of the Privy Council for Scientific and Industrial Research says, among other things, the following: The proposals for the erection of a national fuel research station submitted by the Fuel Research Board has been approved. The station is in course of erection at East Greenwich and will, it is hoped, begin work by the close of the year. From April 1, 1918, the council assumed responsibility for the maintenance and development of the National Physical Laboratory. There has also been established a research board under the chairmanship of Sir Lionel Phillips, to continue and develop the researches into the production of tin and tungsten. Among other important investigations sanctioned is that of a series of tests of home-grown timber which will, it is hoped, afford useful guidance in the reforestation of the country after the war. Satisfactory progress has been made in the past year with the negotiations between the department and the industries of the country for the establishment of industrial research associations. During the year fifteen recommendations in respect of individual researches, inquiries and schemes of research to be directly controlled by the department have been sanctioned. These include the scheme of fuel research, food investigation, tin and tungsten research, as well as five other researches which were begun last year and have been continued under the control of the departmnt. —London *Engineer*, Sept. 6. 1918.

NEWS OF THE INDUSTRY

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields

WAR INDUSTRIAL LIGHTING AND THE RECONSTRUCTION

Important Lessons Learned from the Enforced Speeding of Production Should Assist in Paying the Cost of the War

Speaking before a joint meeting of the Chicago Section of the American Institute of Electrical Engineers, the Western Society of Engineers and other organizations on Nov. 12, Prof. C. E. Clewell of the University of Pennsylvania declared that the lessons which had been learned by purchasers and salesmen of industrial lighting during the war should now become of value in the reconstruction period.

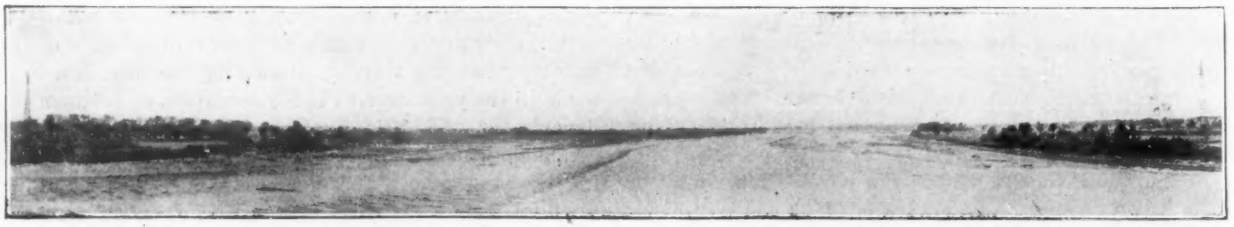
As the basis of his address Professor Clewell used data which he had collected for the War Industries Board. The data were originally collected to be used in the instruction of employment managers for war industries. They dealt with the effect of proper natural and artificial lighting upon industrial production. The data covered not only the field of interior industrial lighting to facilitate production, but also took up the field of protective lighting, which has been of such importance during the war period. Since the data will later be published in complete form, no attempt was made to recite the figures in individual instances, the speaker preferring rather to outline the general character of the information available and to point out the principles and the trends involved. His address was illustrated with slides showing examples of both natural and artificial lighting.

The speaker emphasized the importance of industrial lighting even if no night shifts are employed, since artificial light is used to such a great extent to supplement the natural light during many days and many seasons of the year. Natural light, he said, deserves more attention than it receives. There is room for study, particularly on the problem of how to furnish adequate daylight illumination. The proper control of artificial lighting systems which are used in conjunction with natural light is also a nice problem. It was formerly quite general practice to arrange the lighting circuits so that those lamps near the windows could be turned on at a later hour than those which illuminated the areas in the central parts of the building. Recent experience seems to show, however, that the lamps nearer the windows need to be turned on earlier than those which illuminate the central parts of the building. No entirely satisfactory explanation of this rather queer condition has been evolved, but it seems probable that the conflict of shadows nearer the windows makes the artificial lighting necessary at this point before it is desirable at a greater distance from the walls.

Curves were given to show the amount of light reflected from the walls of buildings adjacent where a distance equal to the ordinary width of an alley intervenes. A double-photometer method was also discussed for determining how much artificial light must be added to give adequate illumination on the interior of a building where natural light is to be relied on to some extent.

W. A. Durgin of the Commonwealth Edison Company spoke briefly on the high-intensity tests which the company is conducting. About 170 plants have been investigated with amazing results. The data show that by increasing the light from three times to twenty-five times its original intensities increases in production ranging from 15 per cent to 100 per cent can be obtained at a cost of about 5 per cent of the payroll. Mr. Durgin now feels that it is conservative to state that a 15 per cent increase in production can be secured through adequate lighting at an expense not to exceed 5 per cent of the pay roll. He expressed the belief that the American engineer should now begin to think as the English are thinking, namely, that it is time to speed up, not to win the war, but to pay for the war.

Great River Span on Towers 171 Ft. High Takes Energy to Coal Mines



At Van Buren, Ark., is a 1975-ft. (600-m.) river span in the Fort Smith-Alma transmission line. The line, which takes energy to industrial and coal-mining load centers, is the property of the Fort Smith Light & Traction Company. The steel towers on each side of the river stand 171 ft. (52 m.) high. They support two three-phase power circuits and one ground wire, all of which are of plow steel strand $\frac{5}{16}$ in. (7.9 mm.) in diameter. The maximum working tension is 6000 lb. per square inch (422 kg. per sq.cm.), and the greatest possible sag is 92.6 ft. (28 m.).

Optimism in Reconstruction Problems

Brig.-Gen. Guy E. Tripp, Chairman of the Westinghouse Electric & Manufacturing Company, Sees Careful Handling of Affairs at Washington and, After Short Transition Period, Great Business Opportunities

GEN. GUY E. TRIPP

BRIG.-GEN. GUY E. TRIPP has returned to New York to resume his duties as chairman of the board of directors of the Westinghouse Electric & Manufacturing Company. With the signing of the armistice General Tripp was able to be relieved of his responsibility in charge of the administration work of the eleven district ordnance offices having charge of the production of ordnance material. The President having accepted his resignation, General Tripp returned to civil life. He takes his office again in the Westinghouse company with great confidence as to the encouraging future for business conditions.

"I AM AN OPTIMIST"

General Tripp in an interview with a representative of the ELECTRICAL WORLD used the words "I am an optimist" and expressed the opinion that the transition of the nation's industries will be largely completed within six months. He feels that the necessary transition from war to a peace basis will be accomplished easily and smoothly.

Two factors were mentioned by General Tripp as illustrating the admirable handling of the situation in Washington:

"First, the determination of the government to see that manufacturers are treated fairly. They are being given cash for their government work to permit them to take care of their obligations.

"Second, the government will not permit large numbers of workingmen to be thrown out of employment.

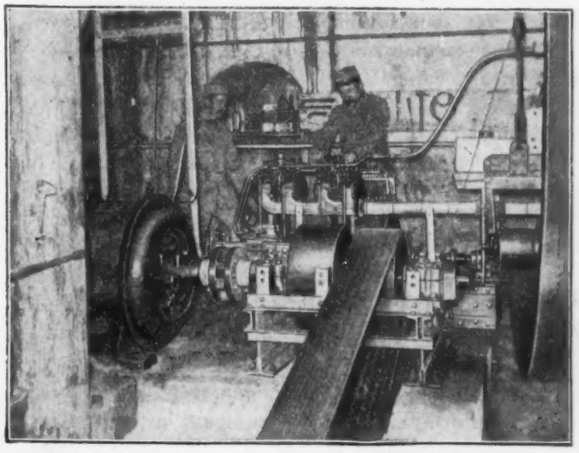
"Those two factors tend to make for a safe readjustment. They make for financial stability without any grave disturbance of conditions."

General Tripp is of the opinion that, assuming that the industries of the country are again in normal channels in six months, there will be great business opportunities before us. He said:

"In considering the probable volume of business after the transition period of six months, which I believe will be sufficient, we should reflect that normal development has been practically at a standstill for the last four years. Bridges, houses, office and other buildings, highway construction, new roads, all things that are necessary to a nation of 100,000,000 population, rapidly increasing, have been to a large degree at a standstill. The deficiency in construction in all of these directions will have to be made up to put the country where it ought to be to meet the requirements of the active population.

"We must also participate in the reconstruction of France and Belgium, doing what we can to restore the devastated sections to their former condition or better. Furthermore, we shall be called on to give help to other countries where development has also been practically at a standstill during the period of the war.

"Nothing short of a grave financial situation—and I do not look for that because the situation is being handled carefully in Washington—will prevent us, in my opinion, from taking a great part in the reconstruction work of the entire world. I believe that the United States is destined to be the leading country of the world, provided, of course, it faces and meets the problems in the ideal American spirit which has brought us the respect of the people of all lands."



READJUSTMENT PLANS IN POWER APPARATUS

Bulletin of the Electrical and Power Equipment Section of War Industries Board Covers Many Important Points

The electrical and power equipment section (of which Walter Robbins is chief) of the War Industries Board has issued Bulletin No. 1 on "Readjustment Plans." It is dated Nov. 14 and follows in full:

"We recognize that every officer of every corporation will be exceedingly anxious to receive as promptly as possible advice as to plans, and are therefore proposing to issue a bulletin to you weekly, or even daily, as we are able to convey anything of a definite nature.

"*General.*—Mr. Baruch has been busy night and day in conference with the heads of other emergency war agencies and with regular Cabinet members in working out definite plans and relations for functions to be performed by each division with reference to its own affairs, so that there may be a consistent policy for all agencies and with reference to matters overlapping or concerning two or more of the agencies. In his session with us yesterday he advised that whereas industry has uniformly, with sacrifice to itself quite irrespective of the degree of hardship, fully supported the war and the controls and restrictions that have been instituted by the War Industries Board, it now becomes the duty of the War Industries Board to assist wherever it properly can industry in its problems.

"*Authority.*—The authority of the War Industries Board will be automatically canceled upon declaration of peace as distinguished from the signing of the armistice. It will continue its functions in assisting the government agencies in all tapering-off programs in the same manner as it assisted the agencies in building up production and in the conversion of industry as long as it may be useful or until the signing of the treaty of peace. In the production program the authority for making contracts lay entirely with the government departments. The War Industries Board advised as to the distribution of those contracts, but could not undertake the responsibility of deciding whether or not contracts should be placed at all. The War Industries Board similarly will not now possess responsibility for tapering down wherever it is found necessary, but probably will be called upon to advise in similar manner as to distribution of any cancellation. Mr. Baruch has expressed the principle that responsibility must be accompanied with final power to act. Likewise, final authority as to action must be accompanied by responsibility. The process of tapering down now seems to be accompanied by a greater degree of responsibility than was incurred when contracts were being placed. For this reason he asks us all to be patient and to urge our industries to be patient, recognizing that it is the desire to withhold all action, if possible, until a clear policy for all industry can be worked out.

"*Standardization.*—Many divisions have under way valuable standardization and conservation programs. So long as the war lasted we felt we had not only justification but authority to bring these programs to consummation. Although we are still technically at war, we feel that since we are only technically at war we have lost our authority, and will attempt to bring to final completion and publication standardization and conservation schedules only upon request of the industry through its war service committees. Those of you who have been serving as members of group committees in consulation here should therefore, by mail or in actual meeting, conclude for yourselves whether you desire to have programs you had tentatively prepared promulgated. If so, the War Industries Board will be glad to do so even at this late date as a recommendation to industry. We feel we cannot go further at this time than merely to make the recommendation. The army has advised that it proposes to go right ahead with army standardization and your group committees should continue to work with it. The distinction we now wish to make, therefore, is the one whether we should recommend that such standardization as has already been effected with the army shall be promulgated as a recommendation of general standardization.

"*Controlled Industries.*—Release of control is to be arranged in the same channel as the control was applied. A recommendation is to be submitted, and if approved by the board members, notification of release will go out in the same manner as notification of control. Each war service committee of an industry now under control will please therefore immediately advise whether it desires to have us recommend that control be released. This should be without regard to the automatic priority now enjoyed which we cover below.

"*Priorities and Restrictions.*—No release of priority has as yet been granted. Much energy, however, is being devoted to the subject with a view to easing from war to peace basis with a minimum of difficulty. There will, of course, be tapering down of many classes of production, such, for instance, as gas masks, as it may possibly be presumed that a league of nations if formed will see to it that Hague conventions are enforced in future so that there will be no need of such equipment. The idea is expressed at this time that some protection may be offered to even such projects as distinguished from a policy of ruthless cancellation, though no definite conclusion has yet been reached.

"Under priority classification and in connection with the Priorities Division we have had voluntary agreements with you as to the non-acceptance of business not in any way related to the war. You are hereby partially released from that phase of your pledge according to the following qualifications:

"(a) In accepting orders of the class heretofore forbidden under this voluntary agreement, such acceptances should be subject to prior delivery of what is essential to that part of our war program which will be carried out, and should also be accepted for secondary consideration as compared with demands incident to reconstruction, which will probably shortly commence to appear. It is due to this last possibility from the point of view of the Allies that the War Industries Board is still holding some measure of restriction on the curtailed industries, and, still further, we may hold some restraint until not only the demands for reconstruction from the Allies can be obtained, but until we can also coördinate the relations between dovetailed industries, if it should be found necessary.

"(b) Restrictions in output were placed upon certain branches and commodities. If the curtailment was 20 per cent, it is now released to 10 per cent; if it was 40 per cent, it is now released to 20 per cent. You are authorized, therefore, to accept orders even on the curtailed industries,

though they may be of an entirely non-essential character, up to that basis.

"(c) Delivery, however, for the present will be restricted to such orders: (1) as are covered by specific or automatic priorities; (2) as are authorized by circulars or permits such as have heretofore been issued by the Priorities Division; (3) as may be authorized by circulars or permits issued hereafter by the Priorities Division, such as Circular No. 57 inclosed herewith; (4) or for purposes or firms embraced within Preference List No. 2.

"We suggest that it is perfectly proper for you to solicit business of any and all classes subject only to the reservation that you are not as yet advised as to when production may be undertaken. It is expected that further suggestions or releases will be offered quickly. If so, we will undertake prompt advices, which is one of the purposes of this series of bulletins.

"*Monthly Reports.*—It is our idea at the moment that these will probably be released after those of Dec. 1 shall have been made. We ask you not to release your own machinery for preparation of these reports at this time, relying upon us to release you just as soon as we are sure their usefulness is past and that there would be no need of returning to any substitute system. This applies to the industries administered by this section which have been under the monthly report form system.

"*Individual Problems.*—Let us remind you that under this section we have been handling stokers, boilers, piping and fittings, engines, compressors, motors, dynamos, supplies, etc., and that we are writing these bulletins from the point of view of all or any. Probably much of what we shall have to say will not apply to all. You will also understand that the idea is simply an attempt to convey to you as rapidly as possible conclusions as they are reached here and, so far as possible, to anticipate your questions.

"*Exports.*—No release at this moment has been granted, and possibly none will be, until it can be determined just what ships can be diverted from transatlantic service to their normal service and just how much space will be available for European shipment for other than necessary supplies to our army and policing force abroad, and for other necessities of life for the countries which are in such great distress. We will advise you just as soon as there is anything definite with reference to release on exports."

PRODUCTION WORK FOR SIGNAL CORPS PURPOSES

Overtime, Sunday and Holiday Work to Cease—Operations Under Contracts or Orders Not Actually in Production Suspended

The ELECTRICAL WORLD has received a copy of the following letter from the office of the chief signal officer of the War Department, sent to those interested in pending contracts for Signal Corps needs:

1. Telegram to you from this office of even date is confirmed as follows: "Request that overtime Sunday and holiday work on Signal Corps production cease and that operations under contracts or orders not actually in production be suspended until further instructions."

2. The above telegram does not constitute a cancellation of your order or contract. It is merely a request, and not a direction, and is sent to you in view of the changed war conditions and without prejudice to any of your rights or the rights of the government.

3. It is the desire of the government to avoid so far as possible any undue disturbance of labor conditions and the creation of any situation as the result of which laborers engaged on war orders will be affected.

4. The attitude of the Signal Corps toward you and other manufacturers to whom it has issued orders will continue to be one of coöperation as heretofore, and it is confidently expected that the Signal Corps can in turn rely upon your coöperation in adjusting any problems created by changed conditions in such a manner as to conserve the interests both of the government and of the contractor.

By direction of the chief signal officer,

E. B. POTTS, Captain, Signal Corps.

EMPLOYMENT SERVICE ON LABOR CONDITIONS

Department of Labor Arrangements to Care for Labor in the Shifting of Men from War to Peace Industries

The Department of Labor announces the following:

To enable the United States Employment Service to find other employment for munitions and other civilian war workers as they are released, the service will be consulted by the War Department and War Industries Board before any action is taken on war contracts.

By arrangement now effective the War Department, through the external relations branch of the division of purchase, storage and traffic of the General Staff, for suspension, curtailment or extension of contracts, will hereafter submit its proposals to a representative of the United States Employment Service and a representative of the facilities division of the War Industries Board. The chiefs of the commodities sections of the War Industries Board will be taken into consultation in the draft of proposals covering commodities, through the respective sections concerned.

The facilities of the United States Employment Service for replacing large bodies of men released from war work have been indicated during the past six days, when thousands of men from curtailed war operations had new jobs found for them and were taken to them. The service is now engaged in rapidly expanding its system of clearance in order to meet the readjustment task laid upon it.

In Ohio 11,000 men released from nitrate plants at Toledo and Cincinnati and 1700 released from an airplane plant at Dayton not only had new employment found for them but were distributed by the Employment Service from the gates of their former plants. Six thousand workers from Camp Jackson, at Columbia, S. C., were immediately upon release sent to new work, and a large number of cantonment workers from Camp Polk, Raleigh, S. C., similarly were replaced.

An appeal to sub-contractors on war work and peace work employers to notify immediately the United States Employment Service of coming labor releases or needs was issued by Nathan A. Smyth, Associate Director General of the Employment Service. The appeal reads:

The arrangement with the War Department and the War Industries Board enables the United States Employment Service to know in advance of and to prepare for releases of men by war industries holding direct contracts.

Sub-contractors are urged to notify the Employment Service of coming releases as far in advance as possible, in order that their employees may be placed elsewhere.

It is particularly necessary that the United States Employment Service be advised of all openings for workers, and non-war manufacturers who in their present and fu-

ture operations need labor are requested to get into touch with the service.

Only through having advance information of the easing off of war industrial operations can the Employment Service adequately devote its facilities toward relocation of war workers.

Extensive transfers made during the past few days, which might well be considered the most dangerous period, give promise that the service can handle the situation, provided that all employers, whether large or small, keep it informed, and it is their patriotic duty to do so.

INDUSTRIAL ASPECTS OF THE DEMOBILIZATION

Assistant Secretary of War Crowell Says that Contract Adjustments Must Be Made Equitably for Industry and Labor

The following statement is issued by the Assistant Secretary of War, Benedict Crowell, as Director of Munitions. Mr. Crowell is specially charged with the industrial aspects of demobilization:

With the signing of the armistice the War Department is faced with an intricate problem and great responsibilities. The industries of the country, which have responded wholeheartedly to the call of the government for increased production and which were going at a rate never before attained, must be diverted from war-time production to their normal occupations in times of peace.

The first and primary consideration in getting back to this normal basis is to make this readjustment with as little inconvenience as possible and with a continuous employment of labor. It is also essential that the production of material for war, which means now a waste of material which could be used for civilian population both here and for the purposes of reconstruction in Europe, should be stopped as speedily as is consistent with the primary consideration of labor and the industries.

Instructions have therefore been issued to all bureaus of the War Department governing the methods of slowing down of production, so that as far as possible there should be a tapering off of war work, giving time for industrial readjustment and for the industry to take up civilian work.

So that manufacturers might as rapidly as possible get into work on civilian needs, at our request the War Industries Board has withdrawn all priority ratings on army work.

No order is being suspended or canceled by the War Department without consideration of the nature of the work or the locality in which the work is being performed, labor and the reëmployment of labor at such places in other industries, and without conference and consultation with the War Industries Board, which has been constantly in touch with the industries of this country, and with the Department of Labor, which is in intimate touch with the conditions of employment in all parts of the United States.

Overtime, holiday and Sunday work has been stopped, and as rapidly as possible and as rapidly as the labor can be used in normal day shifts night shifts will be discontinued. It is often the case that in a certain locality where labor is working on a war project this work may be stopped and the same labor utilized on other work in the same locality.

During the war production has been largely diverted from articles called for in times of peace to war necessities, and civilian needs have been curtailed and non-essentials largely eliminated. With the assistance of the War Industries Board, the articles for war necessities are being rapidly curtailed and the industries proportionately freed to work on civilian needs. Industries which have been largely concentrated in certain areas with resultant congestion of transportation, with a great influx of labor in this area, with inadequate facilities for housing, etc., are being taken into consideration in this readjustment.

The two standards which the War Department has set up for itself are that these contract readjustments must be made equitably, in regard to the industry and labor, and promptly, to safeguard the financial elements of the problem.

NEW FUNCTION OF THE WAR INDUSTRIES BOARD

Under the Arrangement Arrived At, It Will Be the Bridge Whereby Industrial Resources of the Nation Will Be Returned to Peace

B. M. Baruch, chairman of the War Industries Board, authorizes the following:

By agreement with the war-making agencies of the government the War Industries Board is to be promptly advised of revisions and adjustments of all war contracts of the government in excess of $100,000.

Under this arrangement the War Industries Board is to be the bridge whereby the industrial resources of the United States, which have been tied up in the war program of the nation, are to be carried back to a peace basis and rapidly diverted to the normal needs of industry and trade.

While it has never been the function of the War Industries Board to make contracts and while therefore the War Industries Board cannot assume responsibility for any of the financial adjustments with contractors incidental to cancellations, the board will undertake by advice and recommendation so to control the situation as to stabilize the flow of materials, labor and plant facilities back to peace channels.

To this end the facilities section of the War Industries Board will act as the clearing house of all information relating to contract adjustment. It will receive information concerning contracts to be canceled from the various departments of the government and, through the various commodity sections of the board, keep in constant contact with the various industries. At all times will there be contact maintained with the Labor Department also, so that as labor is released from the war industries by contract cancellations immediate demand for its services can be located elsewhere. Bearing in mind the fact that for some time to come there must be continued those parts of the war program necessary to maintain the existing military establishment here and abroad, it will likewise be a function of the facilities section to divert, where possible, the material, labor and facilities released by one department to the requirements of another department.

Conservation of Power Used by Coal Mines

The approach of peace has materially altered the plans of the Production Bureau of the United States Fuel Administration for conserving electric power used at coal mines. It had been planned to establish a field organization throughout the coal-producing fields of the country in connection with obtaining increased efficiency in the use of electric power in the production of coal.

The return to peace conditions will make this organization, which was outlined in a statement recently issued by the Fuel Administration, unnecessary, and the work will be undertaken on a scale more restricted than had been the intent.

RECONSTRUCTION PLANS CLEARER IN WASHINGTON

Progress of Demobilization in the War Department and Return of Men and Officers to Civil Life

The reconstruction situation of the country, so far as Washington is concerned, is clarifying itself from day to day. It appears now that there will not be any reconstruction legislation for the immediate present, and there is every likelihood that there cannot be, because the plans of the leaders of Congress are to adjourn two or three days after they meet Dec. 2 until early next year. This plan is bound up with the desires of the administration, it is understood, owing to the fact that the President intends to sail on Dec. 3 for the peace conference to be held in France. The President intends to address Congress, when it convenes on Dec. 2, the day before the proposed departure, upon the reconstruction needs of the country and to urge that there shall be no hasty legislation.

It is understood in Washington that the President adheres to his previous ideas, recounted in these columns, that the War Industries Board, perhaps in association with members of the War Trade Board, etc., shall carry out whatever reconstruction details are needed to be carried out now. In fact, the War Industries Board is now doing much of this work, although it is a matter of general knowledge in Washington that many members of this board are leaving for their homes; likewise resignations from army officers all over the country who were commissioned for the "emergency," which emergency is said to have now ceased to exist, are being received in large numbers by the War Department, especially from engineers who have been engaged in munition production.

Moreover, army officers who went into what were at first called the various army reserve corps, especially those who are engineers, are receiving opportunity to express preference whether they wish to go to France and Belgium to take part in physical reconstruction work, whether they wish to go into an army reserve or whether they wish to be discharged from the service as soon as possible.

This demobilization and reconstruction is seen in various other agencies of the government. The Food and Fuel Administrations have begun laying off war workers of all ranks. The administration is understood to believe that much of the demobilization of personnel will come about naturally, without legislation immediately, and the United States Employment Service in Washington has announced, after sending out a questionnaire to 500 peace industries, that the 1,700,000 men now in the army camps who did not find their way abroad before the armistice can be taken care of in peace industries at once.

Committees of Congress dealing with questions of taxation and coming appropriations are sending for various heads of government bureaus, insisting that the estimates which were prepared to be sent to Congress Dec. 1 shall be cut very materially, and these cuts are being made, resulting in a wholesale cancellation of orders of a war character not only by the War Department but by navy ordnance bureaus.

The army Ordnance Division has undertaken a wholesale readjustment of its personnel through a board of officers which will consider the subject of arsenal facilities required hereafter for work of manufacture and repair.

WAR EMERGENCY POWER ACTS TO BE ABANDONED

Senator Bankhead, Who Is in Charge of the Two-Hundred-Million-Dollar and Fifty-Million-Dollar Bills, Says the Emergency Has Passed

The so-called war emergency power act, under which Congress was to have appropriated $200,000,000 for assisting in the supply of power by privately owned companies for munitions, transportation of munition makers, etc., will in all likelihood be abandoned. This is also true of the intended so-called temporary substitute for the same measure, which was to have appropriated $50,000,000.

These statements were made to the Washington representative of the ELECTRICAL WORLD by Senator Bankhead, who is in charge of the measures and who had them placed upon the Senate calendar. In the opinion of Senator Bankhead no further emergency for the passage of these bills exists, and he says other Senators share his views.

ABANDONS PRIORITIES FOR ALL WAR MATERIALS

War Industries Board Rescinds Preference List—Preference Will Be Granted to Public Utilities and Other Necessary Enterprises

Edwin B. Parker, priorities commissioner of the War Industries Board, announces that the board has rescinded the entire "preference list."

This means that the classification of industries as essential or less essential to the winning of the war has been abandoned, and that the government will no longer direct the distribution of materials and facilities to industries engaged particularly in war work.

Meanwhile, to aid reconstruction, preference in the allocation of materials and facilities will be granted to railroads, shipbuilding plants, waterways and other public utilities and to enterprises of greatest civilian importance.

JOBBERS ARE RELIEVED FROM THEIR WAR PLEDGES

They Are Free to Proceed in the Conduct of Their Business as Before the War, Says the War Industries Board

By a notice from F. B. Eaves, of the electrical and power equipment section of the War Industries Board, dated Nov. 18, all certificated jobbers and all dealers, contractors and other customers of jobbers are relieved from the obligation to give and require pledges relating to raw materials, semi-finished and finished products. They are free to proceed in the conduct of their business as they were before the war as all restrictions have been removed from jobbers. Jobbers are therefore relieved of the necessity for filing with manufacturers and their suppliers the section certificates.

FUEL ADMINISTRATION SUPERVISION CONTINUES

Dr. Garfield Gives Notice that the Work Will Be Carried On Until the Promulgation of the Treaty of Peace Takes Place

In order that no confusion or misunderstanding resulting from the signing of the armistice might ensue, United States Fuel Administrator Harry A. Garfield gives notice that the rules and regulations and the supervision of the Fuel Administration now in force will continue until the promulgation of the treaty of peace. The statement follows:

In order that there may be no confusion or misunderstanding, the United States Fuel Administrator wishes it understood that the signing of an armistice in no way alters the rules and regulations or the supervision now in force. By act of Congress the Fuel Administration continues until the promulgation of the treaty of peace, and its powers extend to the production, distribution and conservation of fuel, including fuel oil and natural gas.

Due notice will be given of any cancellations or changes in orders and regulations by the duly authorized officials of the Fuel Administration in Washington.

PROGRAM OF MEETING ON ENGINEERING EDUCATION

Joint Meeting of British Educational Mission and Society for Promotion of Engineering Education at M. I. T., Dec. 6 and 7

A joint meeting of the British Educational Mission to the United States and the Society for the Promotion of Engineering Education will be held at the Massachusetts Institute of Technology, Cambridge, Mass., Dec. 6-7, 1918.

The topics to be discussed are:

"The Organization of Engineering Education in Great Britain and the United States." Discussion led by a member of the mission representing Great Britain and Charles S. Howe, president Case School of Applied Science, representing the United States.

"The Effect of the War on Engineering Education in Great Britain and the United States." Discussion led by a member of the mission representing Great Britain and Dr. C. R. Mann, Massachusetts Institute of Technology, representing the United States.

"The Liberal Element in Engineering Education." Discussion led by a member of the mission representing Great Britain and Professor George F. Swain, Harvard University, representing the United States.

WAR-TIME IMPROVEMENTS IN RADIO-TELEGRAPHY

Roy A. Weagant, Chief Engineer of the Marconi Wireless Company of America, Discovers Solution of Static Problem

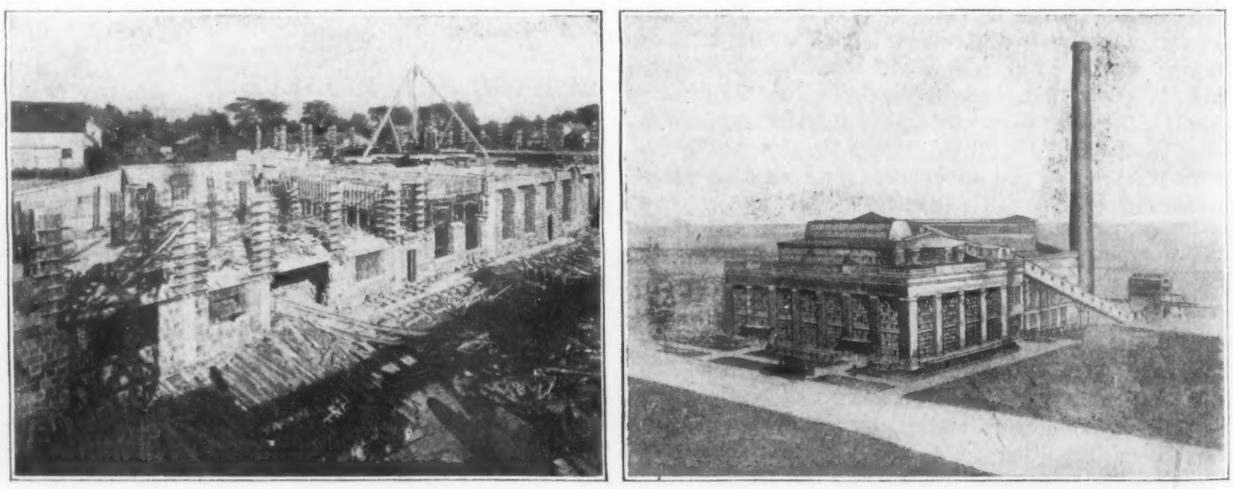
Edward J. Nally, vice-president and general manager Marconi Wireless Telegraph Company of America, has made a statement regarding the invention of Roy A. Weagant, chief engineer of the company, to overcome the effect of static conditions. Mr. Nally's statement says in part:

Mr. Weagant virtually had devoted his life to a study of this perplexing phenomenon and the result of fifteen years of experimental work was about to be published to the world when the United States entered the war. Although patent applications had been made and the claims allowed by the United States Patent Office, the Weagant system was immediately placed at the disposal of the American government, and every precaution was taken to keep the invention secret until the discovery could be safely announced.

Among the revolutionary changes that the new system effects in wireless installations will be the immediate disappearance of the huge steel towers heretofore built at great height to catch the incoming wireless waves. Equipped with the Weagant invention, the wireless receiving antennas are stretched merely a few feet above the ground. The Weagant system, based on a unique selective principle, eliminates interference and permits absolutely clear communication, regardless of the operation of other stations even in the immediate vicinity.

The notable contribution to wireless telegraphy opened by Mr. Weagant's discovery makes continuous wireless communication over the oceans and between continents an absolutely assured fact for twenty-four hours of the day and at every season of the year, regardless of atmospheric conditions.

New Station of the Lorain County Electric Company



The view showing progress in construction and the architect's drawing illustrate the new station of the Lorain County Electric Company at Lorain, Ohio, a Doherty property.

POWER SITUATION AT BUFFALO AND NIAGARA

Armistice Has Not Brought Relief and No Serious Curtailment Is Expected—Coal Supply Is Ample

The signing of the armistice has not relieved the power situation in the Niagara and Buffalo districts. Some contracts have been canceled, but the power released has been quickly taken up. Officials of the Buffalo General Electric Company are said to be in Washington negotiating with the power section of the War Industries Board for the restoration of power commandeered by the government for electrochemical purposes at Niagara Falls.

The River steam station of the Buffalo Company has been carrying all the load possible up to the limit of its capacity of 60,000 kw., and a new 35,000-kw. unit will be placed in operation this fall. No serious curtailment of electricity is anticipated in the Buffalo district in the coming winter. The company has made ample provisions for coal supply and has stored quite a quantity at its steam power station. If the transmitted energy from Niagara is restored to it, the situation will be relieved somewhat. No help is expected for the next six months from the enlargements now being made on the American side, and by the end of next year it is expected that the Hydroelectric Power Commission of Ontario will come to the rescue by the partial completion of its new Queenston station. Even then the demand will exceed the supply.

At present Rochester and Syracuse are sending energy back over the lines of the Niagara, Lockport & Ontario system to help out Niagara Falls.

OUTLOOK IS UNPROMISING FOR WATER-POWER BILLS

Regret Expressed that Proposed Legislation Was Not Enacted as a War Measure While the Emergency Still Existed

There is very little likelihood that anything will be done by Congress concerning the passage of the water-power bills for a long time to come. This opinion was expresed to the Washington representative of the ELECTRICAL WORLD at the office of Senator Shields, chairman of the Senate conference committee, in whose charge the water-power bills have been since the measure was passed by the House of Representatives.

It is hardly likely, according to the best information obtainable in Washington, that Congress will be in session more than two or three days after the new short term begins Dec. 2. The present plan of the leaders, which is known to have the support of the president, is to adjourn because of the President's proposed absence in France. Under the plan of adjournment Congress would not reassemble until after Jan. 1.

Senator Shields has not yet returned to Washington from his home in Tennessee, but there is no disposition among other senators who have knowledge of the situation to regard the proposed water-power legislation as merely war legislation. Many senators feel that the proposed legislation is actually peace legislation, although there is a disposition to regret that it was not passed in time to be of use to the country during the war.

PLANS OF SOCIETY FOR ELECTRICAL DEVELOPMENT

Directors, After Meeting in New York, Decide that Peace Means Opportunities for Constructive Work and New Possibilities

At the meeting of directors of the Society for Electrical Development in New York on Nov. 12 the possible future activities of the society had consideration.

In the general manager's report it was suggested that the society's activities to educate the public to an appreciation of the advantages of electric service should be continued, and that the society could do a valuable work along the lines of helping the reconstruction of the electrical industry upon a peace basis. This would include a number of very important items and carefully prepared propaganda. To do the work thoroughly well would cost money, and the society would have to have the fullest support of the electrical industry.

Directors expressed their approval of the work which has been accomplished. They recognized the fact that ever since the society has been actively at work war conditions have existed. With peace opportunities for constructive work are presented, and the possible value of development work is increased tenfold. The opinion was expressed by the directors that the society is a necessity to the industry, but that heretofore it has been very difficult to secure recognition of this fact, and it was decided that steps should be taken to bring to the attention of every one interested in the success of the industry the value of the society.

President Doherty remarked that the long list of special articles supplied to popular magazines and trade papers during the past six months, the good work done through the daily newspapers, the support given to the society by the trade papers and the interest evinced in the "save-by-wire" campaign throughout the country were all very interesting; but that the time had come for the directors of the society and of every other organization in the country to play the part of prophets, not historians. He said that they should try to visualize the problems with which they will be confronted and plan to meet and solve them. There will be large spaces in many factories vacant and workpeople idle unless something is done, and done quickly, to secure the business necessary to keep such factories and such workpeople employed. He said that the Society for Electrical Development was one of the best prepared organizations to take up this work; that the manufacturers should recognize the possibilities and give the society the wholehearted support to which it is entitled.

It was voted to bring the matter to the attention of the manufacturers in session at Hot Springs, Va., and a committee was appointed to meet with the jobbers at the Cleveland convention in December. Another committee was appointed to take up the matter with the contractor-dealers at the next meeting of the executive committee. The society committees will request the manufacturers, jobbers and contractor-dealers to appoint committees to meet with a special committee from the society, consisting of Henry L. Doherty, representing central stations; Gerard Swope, representing jobbers; L. P. Sawyer, representing manufacturers; James R. Strong, representing contractor-dealers, and J. Robert Crouse, representative-at-large.

PEACE CONSERVATION OF WIRING DEVICES

War Service Committee Holds that a Return to Old Wasteful Conditions Would Be a Most Unfortunate Proceeding

A meeting of the wiring devices group committee of the General War Service Committee of the Electrical Manufacturing Industry was held at the headquarters of the Associated Manufacturers of Electrical Supplies, New York, on Tuesday of this week. After discussion of the conditions in the industry resulting from the armistice, the committee sent the following letter to the manufacturers of wiring devices:

The War Industries Board has accepted our final conservation report of the 16th inst., stating, however:

"We all feel that, even though we cannot be used any longer as either an excuse or reason for conservation, it would be almost criminal for the various groups of manufacturers to waste all the work and effort which have been expended on these programs and not derive any benefit whatever therefrom."

It is the unanimous opinion of the committee, expressed at a meeting to-day, that a return to conditions that existed before the war would be most unfortunate. The studies which have been made by manufacturers as the result of proposed conservation have in practically every instance disclosed wasteful conditions that are most disastrous to profits.

At this writing the committee has no recommendations to make, but will attend the convention of the Chamber of Commerce of the United States at Atlantic City on Dec. 4, 5 and 6 and shortly following those dates will have further information to submit to you. In the meantime you are strongly urged to conform to the conservation program as proposed and accepted by the War Industries Board, with the expectation that this program, modified to meet reconstruction conditions, may be eventually made permanent.

The wiring devices group committee consists of J. C. Dallam (chairman), H. W. Bliven, J. W. Perry, J. H. Trumbull, Shiras Morris and F. V. Burton.

PROGRESS IN STUDY OF INTERNATIONAL TRADE

At Meeting of Committee of the Associated Manufacturers of Electrical Supplies Important Matters Are Discussed

An enthusiastic meeting of the international trade committee of the Associated Manufacturers of Electrical Supplies was held at the offices, New York, on Tuesday of this week. Much work was outlined, which will be completed for the next meeting, to be held on Dec. 12. It is expected now that after the December meeting the committee will be ready to make a report with recommendations to the board of governors. Every section of the association is interested in the work and is taking part in the work through the appointment of special committees.

The main business before the meeting was the review of the answers received from members to the questionnaire issued on Sept. 9. The questions dealt with the articles manufactured by the companies, the materials entering into their manufacture and the component material of chief value in the articles. William Burgess, adviser to the committee, said that he was convinced more and more of the advisability of a separate schedule for electrical materials in the tariff. He feels that this can be arranged in a satisfactory and equitable manner.

One of the subjects discussed was dumping. This was referred, after considerable discussion, to a special committee for a report.

A report from Mr. Burgess on the subject of free ports was received and discussed. The committee appreciates the importance of the question and will give further and careful consideration to it before taking action. Mr. Burgess said that the export business must have the best thought of the industry. The new merchant marine, said Mr. Burgess, will open rapidly greater possibilities for export trade. In recent times there have not been adequate facilities for the exchange of goods with South American countries. There must also be, and these are now being established, adequate banking facilities in those countries to coöperate with manufacturers and exporters of the United States.

A resolution was passed in accordance with which a statement will be prepared by Mr. Burgess to be issued to all members of the association. It will be accompanied by a questionnaire and will cover several points. It will explain briefly the application of the existing tariff law to manufacturers of electrical supplies and materials. It will point out the deficiency due to the fact that lines of product are classified solely on the basis of the component of chief value without taking the labor content into account. It will show the necessity for careful cost analysis of each line of product. It will also emphasize the necessity for immediate action and a canvass of all manufacturers in the branches of the industry served by the different sections.

MANUFACTURERS' CLUB ELECTS NEW OFFICERS

At Annual Meeting at Hot Springs, Va., H. B. Crouse Is Elected President and Le Roy Clark Vice-President

At a meeting of the Electrical Manufacturers' Club at Hot Springs, Va., last week the following officers were elected: President, H. B. Crouse, Crouse-Hinds Company; vice-president, Le Roy Clark, Safety Insulated Wire & Cable Company; secretary, Shiras Morris, Hart & Hegeman Manufacturing Company; treasurer, F. L. Bishop, Hartford Faience Company; commissary, F. W. Sanford, General Electric Company.

MORE WIRE FACILITIES UNDER CONTROL OF THE POST OFFICE

Postmaster-General Burleson Takes Possession of the Marine Cable Systems—Close Control During Readjustment

Under authority of the proclamation of the President, dated Nov. 2, Postmaster-General Burleson has assumed "possession, control and supervision of the marine cable systems of the United States." He states that "there never was a time in the history of this war, for which this joint resolution was passed giving the President the right to control the wire and cable systems, which called for such a close control of the cable system as to-day, and this will continue during the period of readjustment."

Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities.

Order Provides for Reparation.—A temporary order issued by the Illinois Public Utilities Commission in the case of the Canton Gas & Electric Company requires reparation if rates authorized are in excess of rates fixed by a temporary order. The commission has accepted the schedule filed by the company, which in general increases the rate 1 cent per kilowatt-hour for all classes of consumers. In entering the order the commission said: "The commission during the progress of the war has had repeatedly called to its attention by the national government and authorities responsible for the prosecution of the war the need of maintaining public utility service at a standard such that the utilities shall be in a position to render a maximum service in order that the production of war materials and the general industrial activity of the nation may not suffer. The commission has realized the need for prompt action in the cases of the applications of this nature, in order that along with other business enterprises public utilities should not suffer through unnecessary impairment of their credit, which would tend to result in impairment of service. We judge it is not the idea of the national government that the public should be asked to pay rates which are unreasonable, but that along with the protection of the utilities should go the protection of the public against unreasonable and excessive charges for utilities' service."

Public Utilities Should Protect Payment of Bills for Lighting.—The Public Service Commission of Pennsylvania has handed down a decision in a case brought by a consumer of the Harrisburg Gas Company protesting against the discontinuance of service, and orders the company to arrange for an immediate resumption of such service, even though an existing bill had not been paid. The consumer failed to pay a bill of $57.30 for domestic consumption and obtained service at his local business establishment upon a promise to pay the arrears. The commission says: "Depriving the complainant of a supply at his place of business because of a prior delinquency at his residence was a violation of the rights of the complainant, even though he had specifically promised to pay the old bill as one of the conditions imposed by the company before such service was granted him. Such conditions should not have been imposed. The company by so doing was merely trying to recoup the loss sustained by it at the complainant's home, which loss was due to its own neglect. The public service company law permits the requirement that charges be paid in advance or that a deposit be made to secure future payments of such charges, or the supply can be shut off at the first delinquency. The respondent in this case failed to take these precautions. It lost the protection afforded by the act and then, instead of pursuing the ordinary legal processes for the recovery of its debt, it attempted this short-cut method of collection. The act of the company was arbitrary and oppressive and should not be sustained."

Orders Energy Purchased and the Rates Increased.—When R. C. Wolf & Company, operating a central station at Potomac, Ill., with a single-phase transmission line to Henning, applied for increased rates, the records showed that the plant was earning about $4,500 per year and was spending about the same amount, without taking into account a margin for depreciation or interest. On looking into the situation the engineers of the commission discovered that the chief generating station at Potomac was not on a railroad siding and was of a relatively interesting character. The plant had originally cost not less than $20,000, and a preliminary survey indicated it had a depreciated original cost of $12,000. It had recently changed hands for $16,000. In its findings on the case, requiring the construction of a transmission line between Potomac and the electric system at Rossville, the Illinois Public Utility Commission said: "It appears from the report of the engineering staff that the electric utility in Potomac and Henning is in a very precarious condition as regards the possibility of its continuous operation, due to the poor state of repair of the power plant and other portions of the system. . . . It appears that the transmission system, operating at 6600 volts, is within 5 miles of a transmission system owned by the Rossville Electric Light Company, which in turn connects with the power plant of the Hoopeston Gas & Electric Company and which from the evidence herein would afford a satisfactory, adequate and reliable source of supply for Potomac and Henning. It further appears that the power station in Potomac is inefficient in so far as the consumption of coal is concerned and that the citizens of this community are not at present receiving twenty-four-hour service. . . . The evidence clearly indicates the practicability of measures involving a connection with the system at Rossville which would relieve the power station in Potomac, save fuel and give twenty-four-hour electric service. . . . The commission, having considered the rates, finds that the just and reasonable operating expenses of the petitioner under the existing conditions are not less than $4,200 per year, and that a reasonable allowance for accruing depreciation is $800. The commission further finds that the rates hereinafter authorized will yield to the petitioner 5 per cent upon $18,000."

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month.

Louisiana Engineering Society.—"Fuel Conservation in Louisiana" was the title of a paper presented before the Louisiana Engineering Society Nov. 18 by Leo. S. Weil.

N. E. L. A., Philadelphia Section.—At the meeting of the Philadelphia Section, N. E. L. A., Nov. 12, 1918, Walter H. Johnson, vice-president of the Philadelphia Electric Company, addressed the members on the subject "The Company."

A. S. M. E., Philadelphia Section.—On Nov. 26 J. F. Johnson of the Westinghouse Electric & Manufacturing Company will address the Philadelphia Section, American Society of Mechanical Engineers, on the subject "Large Steam-Turbine Design."

I. E. S., Philadelphia Section.—"Accessories for Industrial and Protective Lighting" was the title of a paper presented by Ward Harrison, illuminating engineer National Lamp Works, at the meeting of the Philadelphia Section, Illuminating Engineering Society, held Nov. 15.

A. S. M. E., Connecticut Section.—W. H. Blood addressed the Connecticut Section of the American Society of Mechanical Engineers last Wednesday at New Haven on the "Building of the Hog Island Shipyard." The afternoon was devoted to an excursion trip through power houses in the vicinity.

A. I. and S. E. E., Philadelphia Section.—"Electric Furnaces" was the title of a paper read before the Philadelphia Section, Association of Iron and Steel Electrical Engineers, on Nov. 9 by G. H. Schaffer and L. B. Lindemuth. The subject was discussed from both the electrical and the metallurgical standpoint.

New York Electrical Society.—At the three hundred and sixty-eighth meeting of the New York Electrical Society, held Nov. 19, G. Douglas Wardrop, editor of *Aerial Age*, who has just returned from the front, lectured on the subject "War Aviation in Retrospect; Commercial Aviation in Prospect."

A. I. E. E., Pittsburgh Section.—N. W. Storer, general engineer Westinghouse Electric & Manufacturing Company, spoke recently before the Pittsburgh Section, American Institute of Electrical Engineers, on the subject "New Locomotive and Substation Equipment for the Chicago, Milwaukee & St. Paul Railway." This program was originally planned for the postponed meeting that was to have been held on Oct. 8.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

No Regulation of Opening and Closing Hours.—There will be no national order issued regulating the opening and closing hours of offices, stores and other mercantile establishments and places of amusement, because present conditions do not justify such an order. This is the decision reached by the United States Fuel Administration and communicated to all state directors of conservation. Should an acute shortage of coal occur in any locality, however, the state administrator in whose jurisdiction the shortage occurs will draw up an order which in his opinion will best meet the emergency and have the order approved by Washington before putting it into effect. Reasonable voluntary conservation measures are urged upon all classes of business.

Increase in Brockton Rates.—The Edison Electric Illuminating Company, Brockton, Mass., in announcing an increase in rates says: "This is the first time in the history of this company when rates have been increased. In this instance we have made every possible effort during the past year or more to keep rates down to their present low figure. We found, however, that this could not be done. We are no more immune to constantly rising prices brought on by the war than is the individual, and every one knows how the price of every commodity has soared in the past twelve months. Were the old charges to continue the company would be seriously handicapped in its operations. Rather than sacrifice service when the government is calling for 'more speed and yet more speed' in industry, it was decided that an increase in rates was the wisest course to be pursued."

Ocean Cable Systems.—Preliminary figures of the forthcoming quinquennial report on the ocean cable systems of the United States have been given out by Director Sam. L. Rogers of the Bureau of the Census, Department of Commerce. They were prepared under the supervision of Eugene F. Hartley, chief statistician for manufactures. The companies making up the Ocean Telegraph totals for 1917 are, as in 1912: Central & South American Telegraph Company, Commercial Cable Company of Cuba, Commercial Cable Company of New York, Commercial Pacific Cable Company, Mexican Telegraph Company and United States & Hayti Telegraph & Cable Company. The figures show that for the five years 1907 to 1912, as well as for the ten years 1907 to 1917, there were substantial gains. During the five years the miles of cables increased 4759, or 7 per cent; during the ten years the increase was 26,134, or 56.4 per cent. The gain in number of cable messages was 609,948, or 10.4 per cent, for the five years, and 581,911, or 9.9 per cent, for the ten years. During the five years the gain in gross income from ocean cable telegraph traffic was $7,597,272, or 94.2 per cent, and in net income $3,554,022, or 120.4 per cent. The ten-year gain in these respects was $8,324,790, or 113.4 per cent, and $2,477,795, or 61.5 per cent, respectively. The amount of capital stock outstanding in 1917 was $60,900,000, or 9.8 per cent greater than in 1912. The gain in this respect during the ten years was $8,100,000, or 15.3 per cent. The number of employees, salaried and others, increased 310, or 18.7 per cent, during the five years, and their total salaries and wages $597,337, or 51.2 per cent. For the ten years the increase in number was 759, or 62.9 per cent, and in salaries and wages $849,268, or 92.8 per cent.

Compensation for Land Telegraph Properties.—Newcomb Carlton, president Western Union Telegraph Company, says to stockholders: "On Oct. 9, 1918, the Postmaster General, on behalf of the United States, entered into a contract with the company respecting compensation for the use of the land-line properties during the period of federal control, the salient features of which are: (1) The contract leaves to the company its non-operating income and the income from its eight transatlantic cables. (2) The government to maintain all land-line reserves for depreciation and amortization upon the same bases as heretofore, to continue the maintenance and operation of the property in as efficient condition as when taken over and to return the property on the termination of federal control in as good condition as when received, to pay all other land-line operating charges, including taxes, bond interest and guaranteed rentals and dividends, and to continue the company's plan for pensions, disability and death benefits. (3) As compensation, the government will pay the company the sum of $8,000,000 per annum. Out of such compensation the company will loan to the government each year the sum of $1,000,000, without interest, toward financing approved additions and extensions, funds required for these purposes beyond such amount to be furnished by the government. If new securities are issued by the company for land-line additions or otherwise required, the government will pay the interest or other costs of such securities. The company to limit its dividends during federal control to 7 per cent. (4) On the basis of returns for the first eight months of this year, it is estimated that the company's net income for the calendar year 1918 will be approximately $11,500,000. (5) Viewed in every aspect, the contract is a fair one to the company and the government, and the arrangement was reached through the pursuit of a broad policy by both parties to the negotiation."

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies.

Joint Use of Poles.—Where a public telephone line contracted to maintain private wire along its poles, its removal thereof to a different series of pegs on the poles, if without substantial interference with the efficiency of the wire when properly connected, was entirely within its rights, according to the Supreme Court of Iowa (169 N. W. 35).

Right of Appeal.—Where a gas company, under P. L. 1912, Chap. 792, applied to the Public Service Commission to fix rates, the city and town affected thereby, having intervened under Rule 3 of the Public Utilities Commission, as authorized by Section 17 of such act, had the right to appeal, notwithstanding that Section 34 limits the appeal to "complainant," according to the Supreme Court of Rhode Island (104 A. 609).

Insulation of Line.—The law providing that one controlling the transmission of electricity must insulate the wire at all points where the public are liable to come in contact with it does not require insulation on a wire, properly attached to poles, at a point 30 ft. from a pole, the Supreme Court of Oregon held in Turnidge versus Thompson (175 P. 281). The employers' liability act, providing that persons transmitting electricity shall insulate wires at points where the public may come in contact with them, does not give a member of the public a right of action unless he is an employee or is engaged in a hazardous employment, the word "public" relating only to criminal liability under the act.

Municipal Light Company Must Pay for Use of Poles.—The city of Burlington, Vt., at the time it built its municipal plant contracted with the Burlington Light & Power Company for a joint use of poles for ten years in order to save the expense of an independent pole line, estimated to cost $10,000. For five years the city paid the rental charge, but later in order to help show a profit on the municipal venture it was not paid. The basis for thus repudiating the contract was an ordinance adopted years before the municipal plant was projected and relating to fire-alarm wires only. The ordinance decreed that the top of all poles in the city should be reserved for city purposes. The Supreme Court of Vermont on Nov. 7 decided that the city was in error, and it was ordered to pay the light company $2,600.89, the amount called for in the contract, plus interest.

Men of the Industry

Changes in Personnel and Position—Biographical Notes

W. E. Wood has been appointed manager of the Galveston (Tex.) Electric company.

J. B. Partlow has been transferred from the position of superintendent of the Hortonia Power Company in Brandon, Vt., to take the field end of the company's business.

E. N. Lake, Chicago, has been commissioned a major in the Quartermaster's Corps, United States Army. Prior to his entrance into the army he was manager of the Krehbiel Company.

George H. Porter, district manager of apparatus sales for the Western Electric Company, Chicago, president of the Illinois Athletic Club and an active member of the Electric Club-Jovian League, has become a captain on the staff of General Gorgas.

Elliot Reid, for the past six years advertising manager of the Westinghouse Lamp Company, has been appointed assistant to the general manager, Thomas G. Whaling. Mr. Reid was born in New York in 1889 and was connected with the Equitable Trust Company for three years.

Lewis Lillie, vice-president of the United Gas Improvement Company, has recently been elected general manager in addition. Mr. Lillie has been with the company since 1887, when he took the position of auditor. He advanced in 1894 to comptroller and in 1900 to secretary and treasurer. He became vice-president in 1905.

F. B. Steele, who recently accepted the position of vice-president of the Charles M. Kelso Company, Dayton, Ohio, and who was before that time power engineer for the Dayton Power & Light Company, has been appointed associate general manager of the Utica Gas & Electric Company, Utica, N. Y., of which Frank M. Tait is president and general manager.

J. P. Lottridge has been appointed manager of the Eastern Oregon Light & Power Company, Baker, Ore., succeeding the late Frank A. Harmon. He has also been appointed secretary and assistant treasurer of the company. Mr. Lottridge has been the auditor of the company for the last three years and acted as assistant manager during the illness of Mr. Harmon and since his death.

James M. Barry, engineer of distribution for the Great Western Power Company of San Francisco, has resigned to become superintendent of the eastern division of the Alabama Power Company with headquarters at Birmingham. Mr. Barry was identified with the installation of the electrical equipment for the Noble Electric Steel Company in northern California about ten years ago and was for several years designing electrical engineer for the Northwestern Electric Company at Portland, Ore. With the latter company he had responsible charge of hydroelectric plant and transmission-line work. He left Portland in June, 1914, to become chief of the department of electricity at San Francisco, which position he held until he joined the Great Western staff early last year.

Morse DellPlain, whose election to the vice-presidency and general managership of the Northern Indiana Gas & Electric Company of Hammond, Ind., was announced in a recent issue of the ELECTRICAL WORLD, has been connected with the electrical industry in one way or another since he was ten years old. Mr. DellPlain was born in New Orleans, La., September, 1880, and spent most of his early life in Mexico. From 1890 to 1896 he was employed by the Central & South American Telegraph Company as telegraph operator on the Isthmus of Tehuantepec. From 1896 to 1903 he was in school and college, attending Syracuse University to take the electrical engineering course. The next two years were spent as apprentice in the shops at the Westinghouse Electric & Manufacturing Company at East Pittsburgh, after which he was salesman-engineer in the Westinghouse Syracuse (N. Y.) office. In February, 1909, he resigned to become power engineer for the Syracuse Lighting Company, and on Jan. 1, 1918, was promoted to be sales manager. In August of this year he was transferred to Hammond, Ind., as vice-president and general manager of the Northern Indiana Gas & Electric Company by the United Gas Improvement Company, operator of both the Hammond and the Syracuse plant. Mr. DellPlain is a member of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers and is at present a member of the executive committee of the Commercial Section of the National Electric Light Association.

M. DELLPLAIN

H. M. Turner, for several years a member of the electrical engineering staff at the University of Minnesota, has become assistant professor in the United States Radio School for Officer Candidates, Yale University.

George A. Iler has been appointed to the position of superintendent of operation of the Georgia Railway & Power Company, Atlanta, Ga., succeeding E. P. Peck, resigned. Mr. Iler joined the Georgia company some years ago as chief operator at Tallulah Falls. Afterward he was made head of the repair department under Mr. Peck. Before joining the company he had had experience as electrician in the navy and as a mining electrician.

I. L. Oppenheimer has retired from the active management of the Ohio Electric Railway & Power Company. He will still be connected with the company, however. Mr. Oppenheimer's health has not been good for the past six months. He will continue to carry on his duties as president of the Ohio Electric Light Association. Mr. Oppenheimer promoted and organized the Ohio River property in 1899 and has managed this property ever since that time.

Walter Belding has resigned as superintendent of the municipal electric light plant in Burlington, Vt., to become connected with the Keene (N. H.) Gas & Electric Company. Mr. Belding was graduated from the University of Vermont in 1911 and the next year entered the employ of the Rutland (Vt.) Railway, Light & Power Company. He was electrical superintendent of this company when he resigned toward the end of 1916 to go to Burlington.

H. L. Treeman has been promoted by the J. G. White Management Corporation, New York, from the post of industrial engineer of that organization to that of manager of the electric department of the Eastern Pennsylvania Railways Company and the Pennsylvania Light, Heat & Power Company of Pottsville, Pa. Mr. Treeman was graduated from the Oklahoma Agricultural and Mechanical College in 1909, with the degree of bachelor of science, having specialized in mechanical and electrical engineering. He was associated with the Edison Electric Illuminating Company of Brooklyn as power engineer for a number of years. In 1915 he left the service of that company to accept the position of industrial engineer with the J. G. White Management Corporation.

Obituary

Louis A. Heitmeier, manager of the Detroit office for the F. Bissell Company, Toledo, Ohio, died after a short illness from pneumonia on Nov. 9, 1918. Prior to his joining the F. Bissell Company Mr. Heitmeier was connected with the Wesco Supply Company, St. Louis, and the McGraw Company of Omaha.

TRADE & MARKET CONDITIONS

News of the Trade for the Manufacturer, Wholesaler and Jobber of Electrical Equipment and Supplies— Notes on Industrial Activities and Business Methods

PRODUCTION OF COPPER IS TO BE MAINTAINED

Recent Decisions of War Industries Board on Raw Materials Designed to Make Transition to Peace Basis Easier

By insuring production and continuing wage scales in the raw-materials industries the War Industries Board is attempting to make the transition stage from a war to peace basis less difficult for the manufacturing concerns of the country.

Following the policy adopted with respect to the steel industry, the War Industries Board met the copper producers late last week in Washington, when the following principles were agreed upon:

1. The present rate of production, which is that of the war period, will be maintained in the mines, smelters and refineries, continuous employment being thus assured during the first stage of the transition from a war to a peace basis.
2. The present scale of prices and the existing wage scale will be continued.
3. The War Industries Board or other governmental agencies that may be designated will continue to regulate the price and to allocate the material to consumers on a basis of priority of needs.

It was also announced last week that the War Industries Board had determined on a general policy of continuing all regulated prices in effect until Jan. 1 next, when further developments will be considered. There will be no more price fixing at the present time.

It developed at the copper meeting that the domestic demand for the metal is virtually double that of two weeks ago. In addtiion, Europe is expected to come into the market for very large supplies. In fact, it was brought out as indicative of how Europe would buy that one of the allied governments has made a request to the War Industries Board for the delivery of 200,000 tons of copper.

Both of these decisions should be of considerable importance to the electrical manufacturing industry as they make it possible to enter into negotiations for a thirty days' supply or more without fear of the price dropping. Moreover, by keeping up production and wages a full and satisfactory supply is insured for the consumers. They, consequently, can lay plans for the future with greater freedom and less fear.

ESTABLISHING CREDIT OF CONCERNS WITH TRADE NAMES

Electrical Credit Men Taking Steps to Decrease Losses from Concerns Not Incorporated but Operating as Though They Were

Electrical credit men are making a stand against concerns purporting to be corporations when as a matter of fact the business is unincorporated. These concerns with trade names which do not show the proprietorship are held to be poor credit risks. An attempt is now being made by electrical credit men to establish the credit of these concerns only when the names of the proprietors are known. This not only helps electrical concerns to withhold credit from former poor-pay customers who try to do business under another name, but also in case of necessity gives an attorney the correct legal name.

JOBBERS NOT ORDERING SO FAR IN THE FUTURE

New York Houses Now Have Two to Four Months' Stocks and Are Ordering on a 60-Day Instead of a 120-Day Basis

According to the latest information, jobbers' stocks of electrical goods in New York City run anywhere from sixty days to four months. This condition is better than has generally been reported. However, indications this week were to the effect that these stocks would not be increased but, if anything, allowed to diminsh somewhat.

Ever since the fall of 1915 it has been a more or less general practice on the part of electrical jobbers in New York to order six months ahead. This was necessary owing to delivery conditions. Now, however, the tendency is not to order so far in advance. The prevailing time seems to be sixty days. In other words, the jobbers are not going to replenish their stocks until they have a better idea of how conditions are going to shape up.

There has been a little price cutting, and this for the most part has been in wire and conduit.

While the demand might fall off for a little while, it is expected that there will not be more goods available than the market will absorb. Indications are that the control of raw materials will continue, and the belief exists that the European reconstruction program will require immense quantities of both raw materials and finished products.

JOBBERS ARE BEGINNING TO STIMULATE OLD TRADE

Owing to Condition of Stock and Deliveries, However, Policy of Price Cutting Is Seen to Have Elements of Danger

In accordance with Section 4 of the modified restrictions announced on Nov. 12 by the War Industries Board and reported in last week's ELECTRICAL WORLD, a number of jobbers have already formally notified their trade that they are seeking business and that restrictions are virtually all removed. This action has thrown a kind of scare into the electrical jobbing trade. It is by no means universal, and those houses which have been awaiting developments longer feel that precipitate action might do a whole lot of harm.

Stocks in jobber warehouses, on the whole, are not large. They are decidedly spotty and generally low. Delivery conditions from the manufacturer have not improved, and consequently jobbers' stocks will not be much better this winter unless conditions with the producer change materially.

Therefore a policy of inviting a heavy demand on these stocks might in the long run prove unsatisfactory. Competitive conditions are already starting up, and a few houses are beginning as a result of this policy to shade prices. The damage that can be wrought, especially where stocks are spotty, is not small.

Apparently there is a big building program about to be launched. This alone should provide an outlet sufficient to prevent any price cutting and give the jobbers an opportunity to await developments.

If jobbers will be careful, both in purchasing and in selling so as to shorten the time of turnover to the shortest period consistent with ability to serve customers properly, there is no reason why a large loss should result when

prices fall. Prices appear to be at their upper limit, and with the maintenance of price on raw materials it is doubtful if there will be any decided decline in the electrical market before the first of the year.

To force the demand at this time, however, by cutting prices is merely paring down profits, which even now are not high. There will be enough time later on to take lower profits or a loss when prices are declining without precipitating the condition by competition.

COST OF DOING JOBBING BUSINESS VERY HIGH

Instance Cited of Wages of Particular Class of Labor Advancing in Year from $77 to $99 a Month, or Almost 30 per Cent

The extent to which the cost of doing business has advanced in the electrical supply jobbing end of the industry is considerable. No figures will be available before the middle of next month. Rents, transportation, supplies, labor, etc., however, are known to have made some very surprising jumps, and doubts are expressed that these will come down to any appreciable extent during the coming year.

As an instance of how wages have advanced a prominent jobbing house looked up the wages of a certain type of labor. A year ago this class of labor was paid at the rate of $77 a month. To-day the workmen are paid at the rate of $99 a month. This is an advance of almost 30 per cent. Jobbers have found it very hard to get help. One of the hardest jobs to fill has been that of quotation clerk. The natural result of course has been the demand for more wages.

METAL MARKET CONDITIONS

Price of Copper Remains Fixed Until Jan. 1—Ban on Platinum Off—Spelter Unchanged

Government regulation of copper prices and allocation of materials will continue until Jan. 1 next. The present rate of production and existing levels of prices and wages is to be continued. Export demand continues to be enormous, and France is now in the market for 400,000,000 lb. of copper. It is expected that inquiries for 1919 export delivery will continue to pour in to the big producers.

Last week the War Industries Board and the Ordnance Department announced that the government supply of platinum on hand was sufficient to meet the present needs of the War Department and that it would discontinue receipt of platinum metals.

The market in spelter is quiet and virtually unchanged, with a slightly firmer tone.

NEW YORK METAL MARKET PRICES

	Nov. 12	Nov. 19
Copper:	£ s d	£ s d
London, standard spot	122 0 0	122 0 0
	Cents per Pound	Cents per Pound
Prime Lake	Govt. price 26.00	Govt. price 26.00
Electrolytic	Govt. price 26.00	Govt. price 26.00
Casting	Govt. price 26.00	Govt. price 26.00
Wire base	28.75	28.75
Lead, trust price	8.05	7.75
Antimony	9.25	7.75
Nickel, ingot	40.00	40.00
Sheet zinc, f.o.b. smelter	15.00	15.00
Spelter, spot	8.75	8.50
Tin, Chinese *	No quotations	No quotations
Aluminum, 98 to 99 per cent.	Govt. price 33.10	Govt. price 33.10

OLD METALS

	Cents per Pound	Cents per Pound
Heavy copper and wire	22.50 to 23.00	22.00 to 22.50
Brass, heavy	12.00 to 12.50	12.00 to 12.50
Brass, light	10.50 to 11.00	10.00 to 10.50
Lead, heavy	7.25 to 7.50	6.75 to 7.00
Zinc, old scrap	6.00 to 6.25	5.75 to 6.00

*No Straits offering.

THE WEEK IN TRADE

CANCELLATIONS of orders are becoming more numerous. This is both on government account and by industrial plants with government work. Except for socket devices and perhaps lamps, there is a visible slackening of demand for electrical goods. This has been expected, and the impression prevails that it will probably continue at least until the new year. Readjustment takes time and cannot be done quickly.

Supplies of raw materials at prevailing prices are insured by the action in the past ten days of the War Industries Board. Prices generally show no change, although a few jobbers are beginning to cut them in order to stimulate trade.

Stocks are still in a spotty condition, and the manufacturers are holding out no hope to the jobbers.

Building interests are preparing for a very large new-construction program, but it seems very doubtful if anything of much consequence can be done for three or four months. It will probably be some time after that before the electrical trade feels the benefits.

NEW YORK

Business the past week has shown a decided falling off, and dealers, so to speak, are marking time. Cancellation of war orders on quite a large scale has been taking place, and it will take the market some time to readjust itself to the new conditions.

Some local jobbing houses are making efforts to stimulate trade by sending out notices to the effect that pledges are no longer required and that they are in a position to accept orders. There was also some little price cutting, for the most part in insulated wire and cable. Stocks are anywhere from two to four months, with a tendency to reduce advance ordering from one hundred and twenty to sixty days.

The removal of restrictions on new building operations not exceeding $10,000 and in special cases up to $25,000 may to some extent offset cancellation orders, and heavy business along new construction lines is expected in the spring. Stocks on hand in most lines are in good shape to take care of these requirements.

Labor changes in the war industries, strictly so-called, are noticeable, and some of the largest concerns are already adopting means to lay off help that has proved itself the most inefficient. Prices continue very firm. It is generally conceded that the peak has been reached and that any change from now on will probably be downward. Raw materials are still being held in government control, and no large dealings are expected before the new year.

LAMPS.—The demand for lamps is increasing as the season advances, and supplies on hand are large enough to take care of needs in this country. There are large foreign orders in the market, both from Europe and South America, awaiting shipment.

WASHING MACHINES.—These products are still showing great popularity, and the supply except in one or two small sizes is far behind the orders on hand. Two agencies this week stated that there was not a copper washing machine to be had in the market for quick delivery. Such machines as are on hand are of the galvanized-iron type.

MOTORS.—Owing to the cancellation of numerous war contracts, many factories which were under consideration and in the market for motors of the larger type have now withdrawn their inquiries, and there has been a considerable falling off in demand. Fractional motors, on the other hand, show increased demand and sales.

USED APPARATUS.—One of the largest second-hand dealers reports a slight slackening in demand the past week. Supplies on hand are good, and not much material is coming on the market. Prices show no change.

WIRE.—With the exception of code and outpost wire, stocks on hand appear to be in better shape, and it is now possible to get No. 14, single-braid, in fair quantity. One large jobber reports that he is now able to obtain 25,000 ft. a month.

POLE-LINE MATERIAL.—Owing to the lack of new construction during the war supplies on hand of pole-line material are good and shipments prompt. With the continuance of mild weather new central-station extension work may be looked for immediately.

CONDUIT.—So far as can be learned no change has yet taken place in the conduit situation.

BOSTON

Jobbers continue extremely busy in spite of the cessation of hostilities. No extended cancellation of government contracts has so far been noted in this district, although some plants are about to establish the straight eight-hour day without overtime or Sunday work. No price changes have as yet been announced, but it is generally felt that the top has been reached in practically all lines. Shading here and there would not be surprising in the future. Stocks are low on the whole. The abandonment of priorities on army supply material will soon begin to affect deliveries favorably. Jobbers have begun to send out notices to their salesmen on the road to accept orders for any kind of material and in any amounts within reason. The wholesalers stand ready to absorb a much larger output of washing machines and other labor-saving devices when these are obtainable. Labor shortages are still acute in the trade, and as yet no extended movement has begun from war plants into the civilian-need establishments. The central stations are pursuing a conservative policy as to expansion, preferring in many cases to await the termination of extraordinary financing on the part of the government and the arrival of a lower price for money. Little change is to be seen in credits and collections since the signing of the armistice, but the early resumption of building operations is expected to lead to better business among the contractors and consequent improvement in their credit. The tone of the trade is very optimistic, once the corner can be turned of labor readjustment.

APPLIANCES.—Sales have held up well, and if the supply of appliances increases in the near future, as seems likely, the market appears ready for expansion along staple lines. Little change is to be seen in the volume of business since the close of hostilities.

FIXTURES.—Jobbers are well stocked, and as soon as building operations are resumed on a substantial scale they will be ready to meet requirements by shipments from unusually well-assorted and complete styles. Jobbers have bought very sparingly of fancy fixtures this year.

MOTORS.—Stocks are gradually increasing, and some inquiries are being received from sources outside war plant buyers. Prices hold firm. As soon as building operations get well started a brisk demand for motors is anticipated from all sorts of industrial plants, especially in connection with re-conversion work.

ARC-WELDING APPARATUS.—The outlook is good for increased business in this class of equipment. Deliveries are being quoted about thirty days f.o.b. factory. The continuance of shipbuilding activity will help this trade.

RADIATORS.—Retail sales are fairly satisfactory, but continued mild weather has retarded the flow of these units into the consumers' hands. Some complaint is heard in central-station appliance circles that hardware dealers have been supplied with electric radiators in preference to the former sales agencies.

INDUSTRIAL ELECTRIC TRUCKS.—Business holds up remarkably well despite the increased cost of battery equipment. The volume of business compares very favorably with that of a year ago. Inquiries are coming in well.

LAMPS.—It is too early to see any results of the close of hostilities on the lamp market. Stocks of standard lamps are in good shape, but it is likely to be many months before the supply of miniature is equal to the demand. Prices remain steady. The continuance of the shipbuilding program and expected central-station expansion are looked upon as factors in an early enlarged market.

WIRE.—Business continues very brisk. Many important government orders are being filled, and it is believed by manufacturers that the work of reconstruction abroad will call for large shipments. Close control of prices is expected to continue for some time.

CHICAGO

Absolute market stability is in evidence on every hand. Concerns which have war contracts that one might expect would be the first to be canceled have been notified to go ahead. In cases where cancellations have been made they appear to have been made with great discretion. Jobbers report that inquiries are coming in in good volume and that while orders are somewhat smaller than in the past week they are still numerous. The jobbers have received no cancellations as yet to speak of. There have been no price advances, but at the same time there have been no declines. It is positively stated by reliable jobbers that the sacrificing of stock is the last thing they contemplate. All are fairly well supplied with stock, but there are apparently no serious over-stocks.

The outlook for business in the coming year is certainly excellent. In the railroad field it is reported that building construction will eclipse anything that has been known in recent years. A survey of work which will be begun immediately in Chicago shows that the total amount is about $103,000,000. This is practically all municipal work. Activity among the meat packers still continues.

COPPER WIRE.—The Chicago situation in the smaller sizes of wire has reached a level where it is now expected that it will be six months before a competitive condition again prevails. Manufacturers who supply Chicago distributers make absolutely no promises as to delivery. The situation is particularly bad in No. 14. Accurate news as to the intention of the government concerning its program for the production of outpost wire is eagerly awaited.

CONDUIT.—The stocks of conduit are improving. Shipments are still being made on priority, however. Up to the present time it has been possible to secure conduit on Class A and Class B priorities, but in no case have there been any shipments made on Class C.

HEATING DEVICES.—Manufacturers of heating devices have been notified that they may increase their production 25 per cent. This puts them back on a 75 per cent peace footing.

SPECIALTIES.—Jobbers' stocks of these goods are adequate.

OUTDOOR SUBSTATIONS.—There is considerable activity in connection with apparatus designed for operation on lines supplying mines.

FARM PLANTS.—The Farm Power and Light Manufacturers' Association will not submit its case to the War Industries Board. This decision was reached, following the signing of the armistice, at a meeting of the executive committee of the association in Chicago during the week.

ATLANTA

The quantity of orders placed locally with manufacturers since the armistice was signed shows a slight decrease over the previous week. This is accounted for by the reaction from news of peace and momentary thought on the part of some buyers that prices are due for a slump. The volume of business transacted through jobbers and distributers remains comparatively the same, with small decreases in the higher-priced appliances. Opinion prevails that for the next three months buyers will mark time until condi-

tions become more settled. The lifting of restrictions on certain lines of building will open up a market for a substantial quantity of supplies, offsetting to some extent the decrease in government orders.

Very little can be learned at this time regarding the outcome of work already planned for military establishments in the Southeast. Reports have come in to the effect that additions to Camp Jackson, Columbia, S. C., have been stopped and that 4000 workmen have been released. It is thought that work will continue on the artillery range at Camp Bragg, Fayetteville, N. C., and the tank school at Raleigh, N. C. The letting this week of a million-dollar wiring contract to the T. H. McKinney Electric Company, Atlanta, for the Camp Benning small-arms school at Columbus, Ga., indicates that this camp will be permanent and that the project will be carried through to completion. Electrical construction at this camp will include an 8-mile pole line to connect with the Columbus Power Company's system.

The production of brass is announced as being off 40 per cent. Daily requirements are 3,220,000 lb., while daily production is 1,450,000 lb. Dealers report some cessation in buying, affecting the total volume of business during the last loan campaign and continuing up to this time. Certain appliances, however, are moving briskly.

HEAT REGULATORS.—Distributers report sales on these as being good. Although they have advanced about $2 each this fall, no decrease in sales has been noted. Stocks are ample and shipments good.

APPLIANCES.—Washing machines are going rapidly and incoming shipments do not satisfy the demand. There has been an increased movement in vacuum cleaners this week, accompanying the removal of restrictions on manufacture by the authorities. A substantial demand has opened up for grid stoves and grills. A big market exists for irons. It is impossible to supply the present demand and great difficulty is experienced in securing small lots to handle insistent requirements. Inquiries for electric ranges are increasing, which indicates a latent demand for these when deliveries improve.

BATTERIES.—The sale of dry cells has picked up during the week, and it is expected that the volume of business in these will continue to grow from week to week as the cold weather advances. Deliveries are fair.

SEATTLE—PORTLAND

The signing of the armistice has created a condition of great uncertainty in the minds of most people as to what the future will bring forth. Many opinions are being expressed as to the probable changes in sales of power equipment. The situation is developing rapidly and is being watched with keen interest by all manufacturers. The tendency of the manufacturers seems to be toward curtailing stocks of motors and transformers instead of maintaining a six months' supply. An order has been issued in the Portland district for cutting stocks to four months. This order has not reached Seattle to date but is anticipated. While orders have been received from the East to put into effect more rigid enforcements of the rule relative to establishing a case of necessity before permitting a sale of electrical material, the signing of the armistice has had the effect of holding orders in abeyance temporarily. It is known that many industries requiring equipment will be in the market as soon as government restrictions are removed. Certain restrictions of the War Industries Board have already been removed, and the prospects are that others will follow immediately. This may more than offset any depression caused by the closing down of government work. While it is felt that generally throughout the country the result of peace will be to cause a very marked decrease in demand for small motors and equipment for some time to come, it is the general opinion that such will not be the case in the Northwest because of the character of the work locally.

That the end of the war will give a tremendous impetus to Seattle's huge foreign trade, because of the removal of numerous restrictions now placed on imports and exports as well as in the movement of vessels, is the consensus of opinion among authorities. In carrying out the announced program of renewing the activities interfered with by war the Navy Department has advised that plans are being laid to go ahead immediately with the development work at the Bremerton Navy Yard. This means expending money already appropriated for the purpose, including $329,000 for a power plant and distributing system. In addition, it was announced that the construction program for larger ships at Bremerton will be carried out and keels laid as soon as possible. Already several large yards are making preparations to build larger wooden vessels, from 12,000 tons to 14,000 tons. It is reported that many wooden-ship orders are in sight from French, Italian and Greek interests for ships ranging in tonnage up to 4500 tons. Spruce production for war purposes has been halted in the Pacific Northwest upon telegraphic orders from Washington. The lumber industry of Oregon and Washington is confronted with the most remarkable and difficult transition period in its experience, and the maintenance of the organization perfected to carry on strict war production will depend upon the ability of the industry to adjust itself to directly opposite conditions.

The influenza ban in Northwest cities has been lifted, and both jobbers and retailers report that business is rapidly assuming normal proportions along all lines. The Electrical Contractors' Association of Portland announces that there is considerable activity along certain lines as indicated by calls for bids on new work.

SAN FRANCISCO

To the electrical fraternity of California the past week brought a rather unexpected but most welcome announcement. All present power restrictions are rescinded, and yet there will be enough energy to care for war-work demands as well as for normal service. With the completion of new reservoirs and new connecting lines a most welcome surplus will be shortly available for domestic electrification.

As yet the signing of the armistice has not appreciably affected California electrical business. Shipyards are still busy on their contracts, and as the electrical equipment of a boat is usually purchased at the very last, and as the end of 1919 is officially designated for the completion of such contracts, there will still be a great deal of such business in the future. Food shipments must continue as in the past, if not in even greater volume, so that the numerous California canneries and food factories will require maintenance and extension material and, through good wages, will continue to place much money in circulation. Building restrictions are practically removed, and only the approach of winter and a predicted rainy season can limit the dammed-up flood of contracts.

SCHEDULE MATERIAL.—Sales of standard sockets and switches have considerably lessened, special marine types being demanded for ships and rather rough porcelain types being necessary or acceptable elsewhere. Rosettes have sold well because lack of conduit has let down the barriers against the use of knobs and tubes. As soon as many long-pending building deals can be financed and again set going these standard lines will, it is predicted, more than make up for lost time.

HEATING DEVICES.—Barring a return of the influenza epidemic, California expects the biggest electrical Christmas on record. A welcome bit of news was the government's curtailing to 25 per cent the 50 per cent restriction on factory output. Considerable price uncertainty exists, three popular lines having advanced, while others are as yet stationary.

CONDUIT.—Black, galvanized and sherardized conduit and fittings are still the lines of poorest stock, greatest demand and poorest delivery from the factory.

LAMPS.—Standard lamps are again short, and some effort is being made to help the situation by combing out dealers' stocks that are disproportioned. Lamps rated at 40 watts and 50 watts are rather scarce, and all odd voltages require nearly a month for delivery.

Current Prices of Electrical Supplies

New York and Chicago Quotations

THE prices quoted are those prevailing in standard packages of specified lots on apparatus and appliances in Eastern and Middle West markets at the beginning of business on Monday of this week. They are in all cases the net prices or prices subject to discounts from standard lists of contractors, central stations, dealers and others engaged in the resale of such goods.

Prices in Southern and other nearby markets will rule about the same as those in the Middle West, although slight modifications to cover increased freight and local demands should be expected. In the Far West and on the Pacific Coast the prevailing prices are naturally higher, covering as they must increased freight and the necessity of larger stocks with increased interest and warehouse charges on account of the distances from sources of supply, infrequent turnover of stock and uncertainty as to delivery of goods in transit. Moreover, the Far West presents a wide variation in demand due to a small population spread over a wide area in agricultural and mining communities, as contrasted with the denser population of the East and Middle West, their nearness to the sources of supply, the more frequent turnover in stocks and the constant demands which arise in industrial centers. Price variations may be due to difference in grade of products of different manufacturers, to local conditions, or to both.

ARMORED CONDUCTOR, FLEXIBLE STEEL

Single-Conductor

B. & S. Size	List per 1000 Ft.
No. 14 solid	$61.00
No. 12 solid	71.00
No. 10 solid	90.00
No. 8 solid	106.00
No. 6 solid	145.00
No. 10 stranded	95.00
No. 8 stranded	115.00
No. 6 stranded	160.00
No. 4 stranded	205.00
No. 2 stranded	266.00
No. 1 stranded	315.00

Twin-Conductor

No. 14 solid	104.00
No. 12 solid	135.00
No. 10 solid	185.00
No. 8 stranded	235.00
No. 6 stranded	370.00
No. 4 stranded	575.00

NET PRICE AND DISCOUNT PER 1000 FT.—NEW YORK

Single-Conductor

	No. 14 Solid
Less than coil	List
Coil to 1000 ft	6%–10%
	No. 12 Solid
Less than coil	List
Coil to 1000 ft	6%–10%

Twin-Conductor

	No. 14 Solid
Less than coil	List
Coil to 1000 ft	6%–10%
	No. 12 Solid
Less than coil	List
Coil to 1000 ft	6%–10%

DISCOUNT—CHICAGO

Single-Conductor

	No. 14 Solid
Less than coil	+30% to $73.20
Coil to 1000 ft	List
	No. 12 Solid
Less than coil	+30% to $85.20
Coil to 1000 ft	List

Twin-Conductor

	No. 14 Solid
Less than coil	$115.00
Coil to 1000 ft	100.00
	No. 12 Solid
Less than coil	+20% to $162.00
Coil to 1000 ft	List

ATTACHMENT PLUGS

List ranges from $0.22 to $0.30 each.
Standard packages from 100 to 250.

DISCOUNT—NEW YORK

Less than 1/5 std. pkg	+20%
1/5 to std. pkg	List
Std. pkg	15% to 17%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg	+30% to 12%
1/5 to std. pkg	+5% to 20%
Std. pkg	18% to 44%

BATTERIES, DRY

NEW YORK

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.45—$0.46	$0.45—$0.47
2 to 50	.40	.40— .41
50 to barrel	.35— .36	.36— .37
Barrel lots	.32— .329	.33— .339

BATTERIES, DRY—Continued

CHICAGO

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40 to $0.45	$0.40 to $0.45
12 to 50	.35 to .39	.35 to .39
50 to barrel	.319 to .362	.329 to .382
Barrel lots	.289 to .332	.299 to .342

CONDUIT, METALLIC FLEXIBLE

Size, In.	Ft. per Coil	List per 100 Ft.
⅜	250	$5.00
½	250	7.50
⅝	100	10.00
¾	50	13.00
1	50	21.00
1¼	50	26.00
1½	25–50	35.00
2	25–50	45.00
2½	25–50	52.00

NET PER 1000 FT.—NEW YORK

	Less than Coil	Coil to 1000 Ft.
⅜-in. single.trip.	$75.00	$63.75— 69.75
⅜-in. double strip	75.00— 82.50	72.00— 75.00
½-in. single strip	100.00	85.00— 93.00
½-in. double strip	100.00—110.00	96.00—100.00

NET PER 1000 FT.—CHICAGO

	Less than Coil	Coil to 1000 Ft.
⅜-in. single strip	$75.00	$63.25 to $63.75
⅜-in. double strip	78.25 to $90.00	71.25 to 75.00
½-in. single strip	100.00	75.00 to 85.00
½-in. double strip	105.00 to 120.00	93.00 to 100.00

CONDUIT, NON-METALLIC FLEXIBLE

Size, In.	List per Foot	Size, In.	List per Foot
⅜	$0.05½	1	$0.25
½	.06	1¼	.33
⅝	.09	1½	.40
¾	.12	1¾	.47
⅞	.15	2	.55
1	.18	2½	.65

NET PER 1000 FT.—NEW YORK

	Less than $15 List	$15 to $60 List	$60 to $150 List
⅜-in.—	$29.60–51.70	$24.60–35.20	$23.00–30.25
½-in.—	30.00–56.40	28.00–38.40	26.00–33.00

NET PER 1000 FT.—CHICAGO

	Less than $15 List	$15 to $60 List	$60 to $150 List
⅜-in.—	$44.00–60.00	$30.00–33.00	$26.50–29.15
½-in.—	48.00–65.00	33.50–36.00	29.00–31.80

CONDUIT, COUPLINGS AND ELBOWS, RIGID IRON

Card No. 40

Size, In.	Conduit, List per Foot
⅜	$0.08½
½	.08½
¾	.08½
⅞	.11½
1	.17
1¼	.23
1½	.27½
2	.37½
2½	.58½
3	.76½

CONDUIT, COUPLINGS AND ELBOWS, RIGID IRON—Continued

Size, In.	Couplings, List	Elbows, List
⅜	$0.05	$0.19
½	.06	.19
¾	.07	.19
⅞	.10	.25
1	.13	.37
1¼	.17	.45
1½	.21	.50
2	.28	1.10
2½	.40	1.80
3	.60	4.80

DISCOUNT—NEW YORK

	¼ in. to ½ in.	¾ in. to 3 in.
Less than 2500 lb	7% to 7.1%	9% to 9.1%
2500 to 5000 lb	10% to 10.1%	12% to 12.1%

(For galvanized deduct six points from above discounts.)

DISCOUNT—CHICAGO

	¼ to ½ In.	¾ to 3 In.
Less than 2500 lb	+5.5% to 3.5%	+3.5% to +1.5%
2500 to 5000 lb	+2.5% to +0.5%	+5% to 1.5%

(For galvanized deduct six points from above discounts.)

FLATIRONS

NEW YORK

List price	$6.00 to $7.00
Discount	20% to 30%

CHICAGO

List price	$6.00 to $7.00
Discount	20% to 30%

FUSES, INCLOSED

250-Volt	Std. Pkg.	List
3-amp. to 30-amp	100	$0.25
35-amp. to 60-amp	100	.35
65-amp. to 100-amp	50	.90
110-amp. to 200-amp	25	2.00
225-amp. to 400-amp	25	3.60
450-amp. to 600-amp	10	5.50
600-Volt		
3-amp. to 30-amp	100	$0.40
35-amp. to 60-amp	100	.60
65-amp. to 100-amp	50	1.50
110-amp. to 200-amp	25	2.50
225-amp. to 400-amp	25	5.50
450-amp. to 600-amp	10	8.00

DISCOUNT—NEW YORK

Less than 1/5 std. pkg	30%
1/5 to std. pkg	41% to 45%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg	30%
1/5 to std. pkg	40% to 41%

FUSE PLUGS

3-Amp. to 30-Amp.

NEW YORK

	Per 100 Net
Less than 1/5 std. pkg	$6.00 to $9.3[illegible]
1/5 to std. pkg	5.25 to 7.00

Standard packages, 500. List, each, $0.07

CHICAGO

	Per 100 Net
Less than 1/5 std. pkg	$8.00
1/5 to std. pkg	7.00

Standard packages, 500. List, each, $0.07

LAMPS, MAZDA OR TUNGSTEN

110 to 125 Volts

Regular, Clear:	Std. Pkg.	List, Each
10 to 40-watt—B	100	$0.35
60-watt—B	100	.40
100-watt—B	24	.85
75-watt—C	50	.70
100-watt—C	24	1.10
200-watt—C	24	2.20
300-watt—C	24	3.25
Round Bulbs, 3½-in., Frosted:		
15-watt—G 25	50	.60
25-watt—G 25	50	.60
40-watt—G 25	50	.60
Round Bulbs, 3½-in., Frosted:		
60-watt—G 30	24	.82
Round Bulbs, 4½-in., Frosted:		
100-watt—G 35	24	1.15

DISCOUNT—NEW YORK

Less than std. pkg.	List
Std. pkg.	10%

DISCOUNT—CHICAGO

Less than std. pkg.	List
Std. pkg.	10%

LAMP CORD

Cotton-Covered, Type C, No. 18

NEW YORK

	Per 1000 Ft. Net
Less than coil (250 ft.)	$30.47—$40.77
Coil to 1000 ft.	27.42— 30.22

CHICAGO

	Per 1000 Ft. Net
Less than coil (250 ft.)	$38.00
Coil to 1000 ft.	28.00

LAMP GUARDS, WIRE

Standard packages from 50 to 150

NEW YORK

Net per 100	$24.00

CHICAGO

Net per 100	$23.93 to $30.00

OUTLET BOXES

Nos.	List per 100
101—A, A 1½, 4 S.C., 6200, 320	$30.00
102—B.A., 6200, S.E., 300, A.X., 1½, 4 S.	30.00
103—C.A., 9, 4R, B 1½	25.00
106—F.A., 7, C.S., 1½, 3 R	20.00

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $10.00 list	26%	20%
$10.00 to $50.00 list	36%	31%

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $10.00 list	20%	10%
$10.00 to $50.00 list	30%	20%

PIPE FITTINGS

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	10%
1/5 to std. pkg.	20%
Std. pkg.	30%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	5%
1/5 to std. pkg.	15%
Std. pkg.	25%

PORCELAIN CLEATS—UNGLAZED

Two and Three Wire

NEW YORK

	Per 1000 Net
Less than 1/5 std. pkg.	$21.00 to $34.00
1/5 to std. pkg.	17.85 to 28.90

Standard package, 2200. List per 1000, $21 to $34

CHICAGO

	Per 1000 Net
Less than 1/5 std. pkg.	$21.00–24.15
1/5 to std. pkg.	17.85–21.00

Standard package, 2200. List per 1000, $20.00–21.00

PORCELAIN KNOBS

NEW YORK

Per 1000 Net.	Std. Pkg. 3500 5½ N.C.—Solid Nail-it—N.C.	Std. Pkg. 4000 N.C.
Less than 1/5 std. pkg.	$16.00 to $22.00	$32.00
1/5 to std. pkg.	13.60 to 18.70	27.20

CHICAGO

Per 1000 Net.	Std. Pkg. 3500. 5½ N.C.—Solid Nail-it—N.C.	Std. Pkg. 4000
Less than 1/5 std. pkg	$13.00–$18.40	$32.00–$36.80
1/5 to std. pkg.	11.50– 16.00	27.20– 32.00

SOCKETS AND RECEPTACLES

	Std. Pkg.	List
½-in. cap key and push sockets	500	$0.33
½-in. cap keyless socket	500	.30
½-in. cap pull socket	250	.60

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	+20%
1/5 to std. pkg.	List

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	List
1/5 std. pkg.	10%

SWITCHES, KNIFE

250-Volt, Front Connections, No Fuse

High Grade:	
30-amp. S. P. S. T.	$0.80
60-amp. S. P. S. T.	1.20
100-amp. S. P. S. T.	2.25
200-amp. S. P. S. T.	3.48
300-amp. S. P. S. T.	5.34
30-amp. D. P. S. T.	1.20
60-amp. D. P. S. T.	1.78
100-amp. D. P. S. T.	3.38
200-amp. D. P. S. T.	5.20
300-amp. D. P. S. T.	8.00
30-amp. 3 P. S. T.	1.80
60-amp. 3 P. S. T.	2.68
100-amp. 3 P. S. T.	5.08
200-amp. 3 P. S. T.	7.80
300-amp. 3 P. S. T.	12.00
Low Grade:	
30-amp. S. P. S. T.	$0.42
60-amp. S. P. S. T.	.74
100-amp. S. P. S. T.	1.50
200-amp. S. P. S. T.	2.70
30-amp. D. P. S. T.	.68
60-amp. D. P. S. T.	1.22
100-amp. D. P. S. T.	2.50
200-amp. D. P. S. T.	4.50
30-amp. 3 P. S. T.	1.02
60-amp. 3 P. S. T.	1.84
100-amp. 3 P. S. T.	3.76
200-amp. 3 P. S. T.	6.76

DISCOUNT—NEW YORK

	High Grade
Less than $10 list	+15% to +10%
$10 to $25 list	+10% to 2%
$25 to $50 list	5%
	Low Grade
Less than $10 list	+5% to list
$10 to $25 list	List to 8%
$25 to $50 list	15%

DISCOUNT—CHICAGO

	High Grade
Less than $10 list	+ 15%
$10 to $25 list	List to 2%
$25 to $50 list	5%
	Low Grade
Less than $10 list	+5%
$10 to $25 list	8%
$25 to $50 list	15% to 16%

SWITCHES, SNAP AND FLUSH

5-Amp. and 10-Amp., 125-Volt Snap Switches

	Std. Pkg.	List
5-amp. single-pole	250	$0.28
5-amp. single-pole, ind.	250	.32
10-amp. single-pole	100	.48
10-amp. single-pole, ind.	100	.54
5-amp. three-point	100	.54
10-amp. three-point	50	.76
10-amp., 250-volt, D. P.	100	.66

10-Amp., 250-Volt Push-Button Switches

	Std. Pkg.	List
10-amp. single-pole	100	$0.45
10-amp. three-way	50	.70
10-amp. double-pole	50	.70

SWITCHES, SNAP AND FLUSH—Continued

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	+20%
1/5 to std. pkg.	List
Std. pkg.	15% to 17%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	List to 10%
1/5 to std. pkg.	10% to 16⅔%
Std. pkg.	18% to 25%

SWITCH BOXES, SECTIONAL CONDUIT

Union and Similar—	List Each
No. 155	$0.34
No. 160	.60

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $2.00 list	Net to 30%	Net
$2.00 to $10.00 list	10% to 35%	5%
$10.00 to $50.00 list	20% to 37%	10%

DISCOUNT—CHICAGO

	Galvanized	Black
Less than $2.00 list	25% to 40%	20% to 30%
$2.00 to $10.00 list	25% to 50%	20% to 40%
$10.00 to $50.00 list	25% to 60%	20% to 52%

TOASTERS, UPRIGHT

NEW YORK

List price	$6.00 to 6.50
Discount	20% to 30%

CHICAGO

List price	$6.00 to $7.00
Discount	20% to 30%

WIRE ANNUNCIATOR

NEW YORK

	Per Lb. Net
No. 18, less than full spools	$0.54–$0.66
No. 18, full spools	.52– .56

CHICAGO

	Per Lb. Net
No. 18, less than full spools	$0.65 to $0.71
No. 18, full spools	.55 to .595

WIRE, RUBBER-COVERED, N. C.

Solid-Conductor, Single-Braid

NEW YORK

	Price per 1000 Ft. Net		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
14	$20.00–$25.00	$15.00–$17.00	$15.00–$15.75
12	23.58– 27.09	21.62– 29.09	17.68– 23.22
10	30.20– 37.80	27.45– 32.40	23.47– 32.40
8	42.74– 53.34	38.85– 45.72	33.21– 45.72
6	61.50– 84.42	55.35– 72.36	52.58– 55.48

CHICAGO

	Price per 1000 Ft. Net		
No.	Less than 500 Ft.	500 to 2500 Ft.	2500 to 5000 Ft.
14	$25.00	$18.00–$25.0	$15.50
12	$29.46– 31.44	29.46– 31.44	25.54– 31.44
10	41.10– 43.84	41.10– 43.84	34.62– 38.36
8	57.00– 61.76	57.00– 61.76	50.18– 54.04
6	85.31– 97.68	85.31– 85.47	77.21– 85.47

WIRE, WEATHERPROOF

Solid-Conductor, Triple-Braid, Size 4/0 to 3 Inc.

NEW YORK

	Per 100 Lb. Net
Less than 25 lb.	$39.75 to $44.00
25 to 50 lb.	39.75 to 42.00
50 to 100 lb.	38.75 to 40.00

CHICAGO

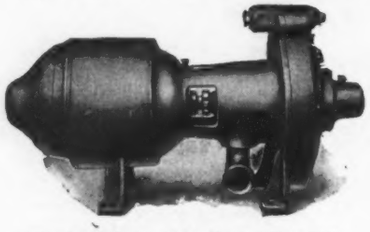
	Per 100 Lb. Net
Less than 25 lb.	$41.00 to $41.76
25 to 50 lb.	39.75 to 40.76
50 to 100 lb.	38.75 to 39.76

NEW APPARATUS & APPLIANCES

A Record of Latest Developments and Improvements in Manufacturers' Products Used in the Electrical Field

Three-Bearing Steam-Driven Lighting Sets

Built for generating electrical energy wherever steam is available, the Lucey Manufacturing Corporation, Woolworth Building, New York City, is making a steam turbine and an electric generator in one complete unit. Two sizes are



TURBO-GENERATOR SET READILY INSTALLED

obtainable, a ¾-kw. machine and a 1½-kw. outfit which generates electricity for sixty 25-watt lamps or their equivalent.

The two sizes are very similar in design, each being assembled on a single base and having a small steam turbine mounted on the same shaft with a 110-volt direct-current dynamo. The shaft is supported on three ball bearings and the entire mechanism is completely inclosed. It is said that there is little vibration with the "Turbolite," as the device is called. There is a governor in the turbine wheel which may be adjusted without disassembling the machine. Steam pressure of from 75 lb. to 150 lb. will result in the outfit running at from 2500 to 3000 r.p.m. Because of its simplicity and portability it is said to be adapted for construction work and ship lighting besides other uses.

Interchangeable Cut-out Bases

The use of "Noark" tap straps now enables the same "Noark" cut-out bases to serve on either branch or main lines, thus reducing the quantity of material needed by wiremen and the stocks carried by supply houses.

The cut-out bases are obtainable in two ampere capacities, 0-60 and 61-200, in one-pole, two-pole and three-pole sizes, and in various styles and voltages. The contacts are secured in the porcelains without screws passing through from underneath, consequently doing away with waxed counterboxes, yet interposing a solid insulating body between the live metal parts and the surface upon which the bases are mounted. While securely positioned the contacts are purposely loose, enabling them to maintain perfect junction with the ferrules of fuses. The tap straps are made in five different kinds for each style of base.

Many combinations are said to be made possible by these interchangeable bases and tap straps which are being made for National Electrical Code fuses by the Johns-Pratt Company of Hartford, Conn., and are being distributed by the H. W. Johns-Manville Company of New York City.

Floor Stand for Portable Drill

In drilling holes in ceilings for wiring the vibration of a portable electric drill resting on his shoulder is annoying to the operator. To obviate this disadvantage A. J. Grenzig of 370 Pearl Street, Brooklyn, N. Y., has invented and is manufacturing a holder for portable drills. Not only does this stand hold the drill in a firm operating position, but it may also be wheeled about.

READY TO BE WHEELED ABOUT AND IN STATIONARY POSITION

Heavy pipe forms the upright structure of the device, which is equipped with a cast-iron base and a set of wheels. A handle is furnished which when resting against the post draws the wheels above the floor, insuring a firm foundation on the base, but which drops the wheels to the floor when drawn out to move the stand around. The height and pressure of the drill are regulated by a lever on the side which moves the post upward and downward.

Bench-Type Buffing and Grinding Motors

A number of sizes of double-wheel buffing and grinding motors for bench work have been added to its line of pedestal type grinders by the U. S. Electrical Manufacturing Company of Los Angeles, Cal., which the makers say have proved very useful in shipbuilding and other shops.

The alternating-current motors of the rigid riveted-frame type range from 0.5 hp. to 3 hp. and are totally inclosed, having exposed laminations to facilitate heat radiation. Multiple machine-wound coils of enameled cotton-covered wire form the stator windings, all connections being incased in heavy cotton-covered paper tubes. Rugged squirrel-cage rotors are used and the shaft runs in ball bearings. Provision is made for lubrication by liberal reservoirs from which grit and dust are excluded by sealing rings incorporated in the housing.

Spindles are of heavy one-piece steel construction, while the grinding seats are adjustable in all directions and, if desired, can be removed. The wheel guards are said to be sturdily constructed and the waterpots can be swung out of the way under the table of the grinder. The manufacturers furnish either push-button control or no-voltage-release switches as extra equipment if so desired.

Renewable Fuse with Visible Ampere Rating

Both ferrule and knife-blade styles may be obtained in the renewable fuses being manufactured by the Volk Manufacturing Company, Westport, Conn. Better arc-suppressing qualities are said to be obtained from these fuses because the fusible link is not fastened to the contacts on the inside but is folded over so that a small portion lies on the exterior of the fuses underneath the contact caps. In this way a larger amount of arc-smothering material is

VISIBLE END OF FUSIBLE LINK CONTAINS AMPERE RATING

placed inside the fuses than if the link contact blocks occupied some of this space. Another feature pointed out by the manufacturer is the current mark-

ing on the end of the link that is visible on the outside of the fuse. This assists in preventing renewing fuses with improper ampere links. A screwdriver is the only tool necessary to reload the knife-blade type.

Portable Conveyor

A considerable saving in both time and labor in loading, unloading and piling operations is said to be effected by the portable machine shown in the

FOR INDOOR AND OUTDOOR LOADING OR UNLOADING AND PILING

accompanying illustration and made by the Brown Portable Conveying Machinery Company of 105 La Salle Street, Chicago. Many different kinds of material may be handled by the conveyor, the manufacturers stating that sugar and flour in bags can be loaded or unloaded with the same ease and celerity that boxes and baled hay are piled up. Warehouses, freight yards and factories are the fields of activity for this machine, which is operated by a 3-hp. type C. S. Westinghouse motor.

Ornamental Sewing Lamp

Having a complete sewing outfit, pegs for spools of thread, and with the base hollowed out as a receptacle for buttons and other accessories, a lamp has been put on the market by the American Lamp Company, 506 South Wabash Avenue, Chicago. The lamp is made in two styles, a floor height and a portable-table size. Hand-carved wood having a rubbed mahogany finish is used for the base and pedestal, while the shade is metal, finished on the outside in mahogany with decorations and on the inside with aluminum for reflection purposes. Cutler-Hammer push-buttons and Benjamin swivel plugs are a part of these sewing lamps, which are supplied with a length of silk cord.

Double-Duty Spotlight

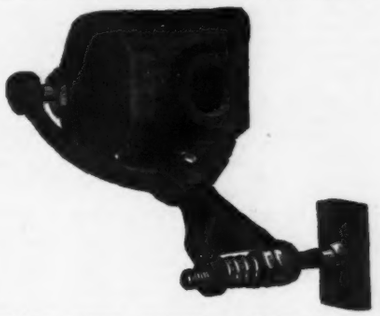
For use as a conventional automobile spotlight and likewise as a danger signal, the "Red Spot" searchlight has been placed on the market by the F. W. Wakefield Company of Vermilion, Ohio. Back of the bulb in the spotlight is a red cylinder which, upon the operation of a button, incloses the bulb and converts the light from white into red. Protection is thus afforded from approaching cars while making roadside repairs. When the red light is turned toward the rear it may serve as an emergency tail-light or to give notice that the car has been stopped in the line of traffic. This feature might be used to advantage by trucks engaged in urban distribution repair work.

Because the rotary switch, socket, lamp and cylinder are in one complete unit it is said they can be removed from the back of the spotlight without risk of damaging the reflector. Heavy-gage steel with the enamel baked on is utilized for the outside shell, which is made to be dust-proof, water-tight and moisture-tight and to eliminate vibration and rattle.

A searchlight mounted on a pedestal base may also be obtained for use on yachts and motor boats.

Marine Water-Tight Door Switches

The door switches which are illustrated here are designed for the purpose of acting instantaneously when the door to which they are attached is opened even slightly. The devices are water-tight and made rugged throughout in order to stand up under the



WATER-TIGHT, INDIRECT-ACTING, LEVER-TYPE SWITCH

marine service. The mechanisms are positive and quick in action; less than 0.25 in. (0.8 cm.) movement in the door actuates the switch and makes or breaks the circuit.

They are made in two types, termed direct-acting and indirect-acting. In the direct-acting the plunger impinges directly against the door. In the indirect-acting type the door actuates a lever plunger protected by a spring against slamming or shocks. Both types are adjustable for any direction of conduit entrance and may also be adjusted for varying widths of door frame. They are manufactured by the Benjamin Electric Manufacturing Company, 806 West Washington Boulevard, Chicago.

Electrically Started Lighting Plant

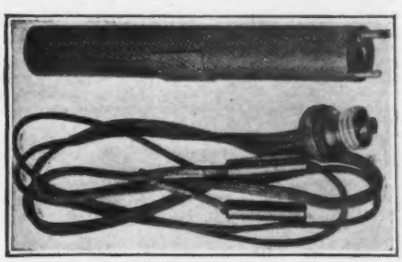
For lighting farms and isolated buildings the Roberts-Hamilton Company of Minneapolis has developed a direct-connected engine and generator plant, including a switchboard and storage batteries. In starting the plant the generator is used as a motor to crank the engine. Power for operating machinery is provided by a pulley on the shaft. Six sizes of these plants, known as the "Rohaco," may be obtained with generators ranging from 40 volts and 25 amp. to 50 volts and 30 amp., some of which use lead batteries and others Edison batteries. The engine is of single-cylinder, jump-spark design and is directly connected to the ball-bearing generator. Voltmeter, ammeter, back-of-board rheostat, inclosed fuses and a starter and contactor switch are mounted on the switchboard.

Low-Voltage Field Rheostats

Moderate-priced field rheostats for use on farm-lighting plants, battery-charging outfits, etc., are being manufactured by the Knoeller Electric Company, De Pere, Wis. The cases of these units are of cast iron, with cast-iron covers, and the contact buttons are mounted on a slate base. The usual style provides twenty-five steps. To protect the resistance units from deterioration from heat and moisture the resistance wire is wound on asbestos tubes and coated with several layers of high insulating fireproof cement. The handwheels are made of seasoned oak properly treated in oil and given three coats of enamel. Rheostats for mounting either on the front or the rear of switchboards can be supplied.

Electric Heater for Use with Medicinal Solutions

In warming solutions for medicinal purposes it is often essential that an even temperature be maintained. With this end in view the William H. Dalton Company of Salem, Mass., is making an electric heater which incloses the tubing carrying the solution from the supply to the point of application so that as the solution is needed it is heated to an even temperature. By using a light-dimming socket in conjunction with the heater it is possible to lower or raise the temperature of the solution by varying the amount of cur-



INCLOSES LIQUID-CARRYING TUBE

rent fed to the heater. Connecting plugs and cord are supplied with the heater as well as a plug for insertion in the ordinary light socket, thus making it possible to carry the heater wherever needed.

Trade Notes

SMOKING LAMP SPECIFICATIONS.—The Bureau of Steam Engineering of the Navy Department has issued a set of proposed specifications for smoking lamps and cigar lighters.

THE COMBUSTION CHAMBER.—The Under-Feed Stoker Company of America, Chicago, has changed the name of its monthly publication from the *Publicity Magazine* to the *Combustion Chamber*.

FRENCH PRODUCTION OF LAMPS.—The present production of incandescent lamps in France is between 15,000,000 and 20,000,000 lamps per year. This may be doubled in the near future, according to M. A. Larnaude, writing in a recent issue of the *Bulletin* of the Société Internationale des Electriciens.

FIRING INSTRUCTIONS IN FOREIGN LANGUAGES.—Complete instructions for the best operation of Jones underfeed stokers have been printed in Polish, Portuguese and Italian by the manufacturers, The Under-Feed Stoker Company of America, Harris Trust Building, Chicago. These are ready for distribution and will be mailed on request. Instructions in English are of little use to boiler-room labor of foreign birth as a rule.

OCEAN SHIPPING PREFERENCE RULES FOR SOUTH AMERICA.—The War Trade Board, after consultation with the shipping control committee of the United States Shipping Board, announced on Nov. 11 the adoption of a new procedure known as W. T. B. R. 301, effective Nov. 18, 1918, for the obtaining of ocean shipping preference for shipments of any commodity, excepting coal, coke, and fuel oil, which are (a) destined to the following countries on the eastern coast of South America, viz., Brazil, Uruguay, Paraguay and the Argentine, or (b) destined to any country or colony by way of Brazil, Uruguay, Paraguay and the Argentine.

ENGLISH EXPORTS FOR AUGUST.—During August last England's foreign trade in electrical goods and machinery was as follows, according to the London *Electrical Review*:

			Eight Months, 1918,
Imports:	August	Increase or Decrease	Increase or Decrease
Electrical goods	$334,620	—$151,970	—$1,038,655
Machinery....	4,620,500	+530,950	+9,415,230
Exports:			
Electrical goods	$831,155	—$455,705	—$3,747,450
Machinery....	6,824,940	—1,396.815	—13,583,935

ISSUANCE OF EXPORT LICENSES.—The War Trade Board announced on Nov. 8 that the regulations heretofore prescribed as to the signing of applications for export licenses, as set forth in W. T. B. R. 214, issued Sept. 10, 1918, have been rescinded. The regulations requiring the filing of powers of attorney have also been rescinded. In order to facilitate the work of filing applications for export licenses, the War Trade Board will now accept applications if it shall appear from the application itself that it bears the personal signature, in ink, of the consignor or of some person to whom the consignor has delegated the duty of signing applications. Shippers will be held responsible, as heretofore, for all statements made upon applications and for full compliance with all rules and regulations of the War Trade Board, and their attention is called to the following provision contained in the form of export license: "By accepting or acting under this license the person to whom the same is issued warrants the correctness and truthfulness, (1) of all answers made and statements contained in the application filed with said board for this license, and (2) of all information given in response to any further requirements of said board in connection therewith, which application and information are by reference made parts hereof."

IMPORTANT LABOR PRECEDENTS.—Since the establishment of the National War Labor Board in April, 1918, 673 cases have been filed with the board for adjudication. The board has made awards and otherwise disposed of 358 industrial disputes in war and essential industries, and 315 cases were awaiting settlement Nov. 1. Among the cases establishing important precedents were: Smith & Wesson Company, Springfield, Mass., and Bridgeport, Conn., munitions plants, enforcement of board's decision by government action; Western Union Telegraph Company, discrimination against union members forbidden; Bethlehem Steel Company, right of men to bargain collectively affirmed; St. Joseph Lead Company, right of employers to refuse recognition of unions affirmed when no such arrangements were in force prior to controversy; Waynesboro and Galesburg cases, minimum wages based on cost-of-living determination; American, Locomotive Company, Schenectady, N. Y., overtime payment on basic eight-hour day schedule, to be calculated for time over forty-eight-hour week divided into six daily periods of eight hours; newsprint paper manufacturers, readjustment of wages at specified periods; railway awards of July 31, financial recommendation that legislature and public service commission take action to enable companies to pay wage advances awarded by permitting increased rates for transportation. The last principle was also established for commodity prices by award in newsprint paper case.

EXPORT LICENSES VALID UNTIL USED.—The War Trade Board announces that, except as here set forth, all export licenses issued on or after Nov. 15, 1918, and all export licenses which were unexpired on Nov. 15, 1918, will be valid until used, unless revoked, notwithstanding that such licenses are stamped as expiring on Nov. 15, 1918, or subsequently thereto. Collectors of customs and the Post Office Department have been advised accordingly. The foregoing rule does not apply to licenses for the exportation of any commodity to Norway, Sweden, Denmark proper, European Holland, Iceland, the Faroe Islands, Switzerland or Greece. The regulations with respect to the preparation and filing of shippers' export declarations remain in effect.

SALE OF FRANKLIN ELECTRIC BRINGS NO SALE CHANGES.—The capital stock of the Franklin Electric Manufacturing Company, Hartford, Conn., as announced in the ELECTRICAL WORLD last week, has been purchased by the Westinghouse Lamp Company. The Westinghouse Lamp Company announces that the corporate identity of the Franklin Electric Manufacturing Company will continue, and that manufacturing operations and sales activities will be conducted under the management of the present personnel. The only notable change among the officers of the Franklin Electric Manufacturing Company has been the election of Walter Terry as president, succeeding the late Jonathan Camp. Both the Franklin Electric Manufacturing Company and the Westinghouse Lamp Company are manufacturers of "Mazda" incandescent lamps.

THE 1919 LYONS (FRANCE) SAMPLE FAIR.—American Consul Clarence Carrigan, in a report calling attention to the fact that many catalogs intended for exhibition at the 1918 sample fair in Lyons, France, did not arrive in time, suggests that it is not too early for American manufacturers and exporters to begin preparations for the 1919 Lyons fair. The 1918 fair was highly successful, the consul submitting nearly 1200 "trade opportunities" growing out of the American catalog exhibit held under the auspices of the American Consulate in Lyons. Even greater results are looked for from the 1919 fair, which will be held in March, and for this reason the consul is anxious that no American firm desirous of participating should fail because of delay in forwarding catalogs. The consulate plans to hire space at the fair and to exhibit American trade catalogs free of charge as in previous years. Consul Carrigan suggests that the display of actual samples, rather than catalogs only, would be preferable wherever this is possible.

COMPANY ADOPTS LIBERAL POLICY TOWARD BOYS RETURNING FROM UNITED STATES SERVICE.—Employees of the Robbins & Myers Company, Springfield, Ohio, who have been in the United States military or naval service will receive, upon their return, substantial evidence that the company appreciates the sacrifices they have been making. The company has decided that, so far as possible, every man who has been in active service or training for active service shall upon his release have his old job back. In cases where it proved impossible to hold open positions the men returning will be provided with something offering compensation equal to what they were receiving at the time they left. Time spent in the nation's service will be regarded exactly the same as time spent in the service of the company so far as service bonuses and insurance policies are concerned. This means that the men who have been gone for any considerable length of time will find upon their return that both their company insurance and their service bonus rate have increased. The company states that "this will be accomplished without in any way displacing or 'demoting' any of those employes who have served the company so faithfully during the present trying period of labor shortage. The company feels that these men and women who have helped bridge the gap are equally entitled to substantial proof of its appreciation."

FOREIGN-TRADE STATISTICS TO BE REVISED AND EXTENDED.—An important revision and extension of the monthly, quarterly and annual foreign-trade statistics published by the Bureau of Foreign and Domestic Commerce, Department of Commerce, are announced to take effect in the near future, probably on Jan. 1. More than 1500 new items will be added to the export classification and the number of import items shown will be materially increased. The plans now nearly completed provide for an enlarged classification for both imports and exports, instead of the two classifications at present used, and instead of the present alphabetical arrangement of items by commodities there will be a more general assembling of items under great groups. As early as last spring the Bureau of Foreign and Domestic Commerce publicly invited suggestions from business men. Adaptability to mechanical tabulation has been kept in mind in making the changes. As there is now a bill in Congress providing for the publication of annual trade statistics by calendar instead of fiscal years, it is possible that the change in classification will coincide with a change to calendar-year figures. Those in favor of the change to the calendar year argue that it will conform to the business year of practically all American industries and will also facilitate comparison with statistics of most foreign countries, which are now compiled on a calendar-year basis.

REPAIR OLD FANS AND SAVE METALS.—The Emerson Electric Manufacturing Company, St. Louis, Mo., which with the other manufacturers of fan motors has pledged itself to the War Industries Board for the conservation of material and labor in every possible way, including in the pledge a provision to encourage the repair of electric fans now in use, has addressed the following statement to its customers: "The junk pile undoubtedly receives each season a large number of electric fans which could be repaired at reasonable expense and made suitable for one to five years' additional service. Even fans which are ten years old, if they are Emerson induction fans, can usually be made just as serviceable as new at an expense of less than one-half the cost of a new fan. The higher prices which it has been necessary to charge for new fan motors during the past year have undoubtedly stimulated the repair business, but it should be susceptible of further increase by well-directed efforts on the part of lighting companies and dealers. It is not too early even now to carry out plans to get the fans in for repairs. Delays in transit under present conditions are not infrequent and must be reckoned with. Many kinds of material are difficult to procure promptly; this sometimes delays the progress of repair work. Central stations and dealers who have fans in their stock which need repairs should by all means send them in now. Do not wait even until Jan. 1. There is no indication that fan motors will be more plentiful or lower in price during 1919, and the congestion of repair work as the season draws near will doubtless be correspondingly increased."

THE AUSTRALIAN MARKET FOR ELECTRICAL GOODS.—The market of Australia for electrical machinery and equipment of every kind is important, and certain to grow rapidly, according to a report on the trade of Australia prepared by the trade commission of the commonwealth and abstracted in the London *Electrical Review*. Various schemes for the production and transmission of electrical energy are under consideration at present, but are held up. The United Kingdom's chief competitor in this trade is the United States, although Italy and Sweden also contribute. As regards appliances other than machinery, Japan has made rapid progress. Recently, a Japanese firm introduced a wire-covered cable with a label attached to the coil bearing the letters "C.M.A.," the obvious inference by the uninitiated being that the firm is a member of the Cable Makers' Association. As the result of representations made by the trade commissioner to the Department of Customs, it has been decided to regard the letters "C.M.A." or the word "Association," when unqualified, as indicating that the manufacturer of the goods is associated with the British Cable Makers' Association and that the goods have been manufactured in accordance with the specifications of that association. It has also been decided that statements such as "Guaranteed equal in all respects to C. M. A. product of similar grade" may be used on wires and cables

manufactured by non-members of the Cable Makers' Association provided that the goods are thereby correctly described. This decision appears to throw on the Customs Department the obligation of seeing that the goods are correctly described. Exports to Australia and Tasmania for the year 1912 were as follows: England, $3,662,189; United States, $1,114,875 (1912-13); Germany, $455,600. During the fiscal years ended June 30, 1914, 1915, 1916 and 1917 the exports from the United States to Australia were respectively as follows: $1,404,793, $1,970,202, $1,776,355 and $1,321,854.

THE OHIO BRASS COMPANY has moved its New York office from 30 Church Street to 1781 Hudson Terminal Building, 50 Church Street.

THE AMERICAN VULCANIZED FIBER COMPANY of Wilmington, Del., has become a member of the Rice Leaders of the World Association.

HICKEY & SCHNEIDER, INC. has transferred its New York office to its factory at Elizabeth, N. J., where all communications should be sent hereafter.

THE BALTIMORE ELECTRICAL SUPPLY COMPANY, 307 North Calvert Street, Baltimore, Md., announces that its office at Atlanta, Ga., has been closed.

THE WESTERN ELECTRIC COMPANY has moved its supply department at Cincinnati, Ohio, from 129 Government Square to 310-312 Elm Street.

THE MECHANICAL APPLIANCE COMPANY, Milwaukee, Wis., has moved its Detroit (Mich.) office from 117 Larned Street, West, to 955 Woodward Avenue.

A. G. CHAPIN has been appointed New England manager of the National Conduit & Cable Company, Inc., and the National Brass & Copper Tube Company, Inc., with headquarters at 200 Devonshire Street, Boston, Mass.

THE LUMINOUS UNIT COMPANY, St. Louis, Mo., has moved its Boston (Mass.) office from 232 South Building to 217 Old South Building, and its Cincinnati (Ohio) office from 515 Johnstone Building, to 318 Johnstone Building.

S. M. MOORE, for the past six years connected with the New Haven (Conn.) office of the General Electric Company, has been appointed service manager of the New England Engineering Company, with headquarters at Waterbury, Conn.

THE PERFECLITE MANUFACTURING COMPANY, lighting fixture manufacturer, has recently moved into new quarters at 119 Main Street, Seattle, Wash. The company was formerly located in the Century Building in the same city.

THE STANDARD & BRONZE MANUFACTURING COMPANY, Pittsburgh, Pa., manufacturer of lighting fixtures, has opened its new showroom at 636 Penn Avenue, Pittsburgh, where the entire eight floors will be given over to the manufacture and display of its products.

THE QUASI-ARC WELDTRODE COMPANY, INC., formerly of 107-109 Lafayette Street, New York, announces that, owing to the necessity for largely increased space, it has moved to its new offices, factory and laboratories at Atlantic Avenue and Warwick Street, Brooklyn, N. Y.

THE LIBBEY GLASS COMPANY of the General Electric Company suffered a loss through fire a week or so ago amounting to $110,000. Fortunately the fire was confined to what was known as the "old plant." This plant, which manufactures lamp bulbs, was acquired by the General Electric Company only a short time ago.

LACLEDE-CHRISTY, St. Louis, Mo., manufacturer of refractory materials, is informing customers that it has a considerable stock of all standard firebrick ready to ship and is prepared to give unusually quick delivery on any special shapes that may be desired. The concern has been accumulating this supply in anticipation of the reconstruction market.

THE H. C. ROBERTS ELECTRIC SUPPLY COMPANY, Philadelphia, Pa., and Syracuse, N. Y., is distributing two styles of alcohol torches, one of which has a thumb-screw adjuster for the blowpipe, while the other style uses a spring to change and hold the pipe in position. This company is also marketing a portable hand-operated pipe-bending machine and a fixture block fitting four sizes of canopies.

KOCH & SANDIDGE, 19 South Wells Street, Chicago, are marketing a small-sized storage battery utilizing pasted lead electrodes, but which is called a dry battery because the electrolyte is held absorbed. These batteries, which are manufactured by the Stolp Company of Chicago, are rechargeable and may be obtained in 0.5-amp. to 5-amp. capacities.

THE FEDERAL PORCELAIN COMPANY reports that its new porcelain factory at Carey, Ohio, is now in full operation for the manufacture of all standard porcelain insulators, such as solid knobs, split knobs, telephone knobs, cleats, tubes, etc. The plant is built with every modern improvement, is of six-kiln capacity, and is conveniently located on three railroads, providing excellent shipping facilities.

THE ASSOCIATED ENGINEERS COMPANY, 180 North Dearborn Street, Chicago, has recently developed and placed on the market a signal lamp to take the place of a bull's-eye lamp in indicating oil-switch positions on switchboards. Among the advantages of this lamp pointed out by the makers is that switchboard-panel cracking is not possible as is sometimes the case with built-in signal lamps, which heat excessively.

C. B. HUGHES, who has been connected with the Minerallac Electric Company, Chicago, for six and one-half years, has been placed in charge of the sales of the insulating varnishes and wood-preservative oils of the Sherwin-Williams Company in the Middle Western district, with headquarters at Chicago. Mr. Hughes was sales manager of the Minerallac Electric Company and prior to his connection with that concern was employed for six years by the Chicago Telephone Company.

THE ELECTRIC FURNACE COMPANY, Alliance, Ohio, it is reported, is planning the removal of its plant shortly to Salem, Ohio, where property has been purchased for the purpose of securing a building adapted to the growing needs of the company. The Electric Furnace Company is engaged, according to the latest reports, in filling government orders for melting furnace equipment, and it is understood that at the new location the working force will be increased from 60 to 200 or 300 men.

EDWIN G. HATCH, 120 Broadway, New York City, is now manufacturing and shipping in large quantities Bergman tubing, a form of conduit usel quite extensively in South America and the Far East. This conduit consists of a paper tube wound spirally and impregnated with some asphaltum compound, this paper tubing being covered with a thin soft-brass tube with its edges crimped together. The tubing is being made in 9-mm. and 11-mm. sizes with plain sleeve couplings attached to each 3-meter length.

BROWN-WHITE, INC., Colonial Trust Building, Philadelphia, has recently been formed to take over the business of the Frank W. Watts Company, manufacturers' agent, of the same address. The company now acts as agent for the Electric Machinery Company, of Minneapolis, Minn., Delta Star Electric Company, Chicago, Ill., Ideal Electric & Manufacturing Company, the National X-Ray Reflector Company, of Chicago, and the Harris Pump & Supply Company of Pittsburgh. H. R. Smith, district manager of the Electric Machinery Company, has recently joined the company.

THE WEYANT ELECTRICAL COMPANY, INC., New York City, export agents for electrical manufacturers, has recently undergone a change in organization. W. R. Weyant has resigned as treasurer and Henry J. Rivoire has been elected in his place. Charles M. Weyant is succeeded by Leo D. Barrer, who will assume the duties of general manager in addition to those of export manager and vice-president of the company. A warehouse is maintained at 222 Madison Street, Brooklyn, N. Y., where a large stock of electrical supplies is carried for immediate shipment. The company represents the following manufacturers for export: Harvey Hubbell, Inc., Bridgeport, Conn.; Hoyt Electrical Instrument Works, Penacook, N. H.; Connecticut Electric Manufacturing Company, Bridgeport, Conn.; Brady Electric & Manufacturing Company, New Britain, Conn.; Viking Electric Company, New York City; Incandescent Lamp Products Company, Newark, N. J., and the Jewel Lamp Company, Newark, N. J. The Weyant Electrical Company has agents in the Philippine Islands, Shanghai, Dutch East Indies, Spain, Portugal, Argentina, Brazil and Chili, and it is the intention of the company from now on to confine itself mainly to foreign trade, in view of the increasing volume of exports.

Trade Publications

BELT CONVEYORS.—All phases of the belt conveyor are covered in catalog No. 175 from the Jeffery Manufacturing Company of Columbus, Ohio.

HOISTING MACHINERY.—A fifty-six page catalog entitled "Brown Hoist" gives illustrated descriptions of the products of the Brown Hoisting Machinery Company of Cleveland, Ohio.

ADJUSTABLE LIGHTING FIXTURE.—The Raymo adjustable fixture for store and office lighting is listed and illustrated in two leaflets from the Moran & Hastings Manufacturing Company, 16 West Washington Street, Chicago.

WASHING MACHINES.—The One-Minute Manufacturing Company of Newton, Iowa, has issued a forty-page catalog describing and illustrating its hand-power, electric-power and belt-power washers, cleaners and iceless refrigerators.

POWER-PLANT DEVICES.—A set of bulletins dealing with "Yarway" power-plant devices and contained in a binder inscribed "Engineering Devices for the Power Plant" has been prepared by the Yarnall-Waring Company of Philadelphia.

WEATHERPROOF AND MOTOR PLUGS.—Circular No. 158-25M distributed by Harvey Hubbell, Inc., Bridgeport, Conn., has for its topic weatherproof plugs and plugs for motor-equipped devices requiring separable plug connection.

BELTING.—"Standardized Leather Belting" is the title of a forty-page booklet published by the Graton & Knight Manufacturing Company of Worcester, Mass. Much useful information and many rules and tables are included in this publication, which is obtainable upon request.

FLOODLIGHTING.—"X-Ray Floodlighting" is the name of a new booklet published by the National X-Ray Reflector Company. It explains the important part floodlighting is playing in the war. Protection lighting, as well as outdoor lighting for night work, is discussed. Several new reflectors are featured in the book.

MARINE LIGHTING AND SIGNALING APPARATUS.—Panelboards, lever-type and direct-acting watertight door switches and revised list prices form the subjects of several sheets issued by the Benjamin Electric Manufacturing Company, 806 West Washington Boulevard, Chicago, for addition to its marine lighting and signaling apparatus catalog.

STORAGE BATTERIES.—Copies of the new editions of several sectional catalogs may be obtained from any sales office of the Electric Storage Battery Company, Philadelphia. Catalog Section SLI covers "Exide" batteries for starting, lighting and ignition service, price list section SLP lists parts of batteries in section SLI, while price list section MS lists up-to-date types of "Exide" batteries for replacing obsolete styles and the parts for these older batteries.

New Incorporations

THE VESTA BATTERY SERVICE COMPANY of Newark, N. J., has been incorporated with a capital stock of $25,000 by L. M. Boice and C. R. Pinney. The company proposes to specialize in battery construction and do repair work, etc.

THE STANDARD INSULATION COMPANY of East Rutherford, N. J., has been incorporated by G. J. and L. G. Lange and Sterling von Winkle. The company is capitalized at $200,000 and proposes to manufacture electrical equipment and devices, etc.

THE POWER MAKER COMPANY of New York, N. Y., has been incorporated with a capital stock of $100,000 by H. Auerbach, H. H. Smith, 834 Sterling Place, Brooklyn, and S. Andrews, 12 Locust Street, Flushing, N. Y. The company proposes to manufacture power plant equipment, etc.

THE CENTRAL NEW JERSEY POWER COMPANY of Morristown, N. J., has been incorporated by John W. Melick, Arthur S. Pierson of Morristown and Edward Wegman of Yonkers, N. Y. The company is capitalized at $125,000 and proposes to construct and operate an electric light and power plant in Morristown.

New England States

LEWISTON, ME.—The voltage of the power plant of the Lewiston, Augusta & Waterville Street Railway Company at Deer Rips has been increased from 11,000 volts to 22,000 volts. New electric transmission lines are being erected to Brunswick and Bath to supply additional energy. New equipment, including transformers, has been installed at the Bath station of the company.

PORTLAND, ME.—The Emergency Fleet Corporation of Philadelphia, Pa., is planning to build a dry dock at Portland, to cost about $2,100,000.

WATERVILLE, ME.—The Central Maine Power Company is installing a new generator at its Rice Rips plant. High-tension transformers of 650-kva. capacity each will also be installed.

PORTSMOUTH, N. H.—Plans have been prepared by the Emergency Fleet Corporation of Philadelphia for the construction of a 5000-ton dry dock at Portsmouth, to cost about $900,000.

PORTSMOUTH, N. H.—Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until Nov. 25 (extension of date from Nov. 18) for the installation of electric traveling cranes in the machine-shop extension (Specification 3502).

BOSTON, MASS.—Drawings have been prepared for the proposed floating dry dock, shops and repair plant, involving an expenditure of about $10,000,000 at Jeffries Point, Boston, Mass., for the Emergency Fleet Corporation, Philadelphia, Pa.

HAZARDVILLE, CONN.—Work has begun on the construction of a new power house near the site of the old "Horseshoe" dam in "Powder Hollow." The power station will be erected on the north side of the Scantic River and will generate about 250 hp. The property was acquired last summer by Howard D. Gordon and William W. Howard from the Hercules Powder Company of Wilmington, Del. The new owners propose eventually to engage in extensive wool and textile manufacturing business. The work is in charge of the Ellison Construction Company of Hartford.

MILFORD, CONN.—The Selectmen have signed a contract with the United Illuminating Company of New Haven for lighting the streets of the town with electricity for a period of five years. The contract provides for about 400 lamps. It is hoped to have the system installed by Jan. 1, 1919.

WATERBURY, CONN.—The Connecticut Light & Power Company has petitioned the Public Utilities Commission for approval of the method of constructing an electric transmission line from Bunker Hill in Waterbury to its generating station at Oxford, on the Housatonic River.

Middle Atlantic States

ALBANY, N. Y.—Contract has been awarded by Burdick & Son, Hamilton and Mosher Streets, to the McCann Building Company for rebuilding its factory recently damaged by fire. New machinery, it is understood, will be purchased by the company, including metal-working apparatus, electric motors, etc. The cost is estimated at $25,000.

BROOKLYN, N. Y.—Improvements are contemplated by the Bureau of Yards and Docks, Navy Department, Washington, D. C., to the Brooklyn Navy Yard, consisting of thirteen portable buildings for general plant extensions. A new shop for light machine work, electrical repair operations and other service will also be erected, to cost with equipment about $800,000. Plans are also being prepared for rebuilding shipway No. 1, to cost about $400,000.

BUFFALO, N. Y.—Bids, it is reported, are being asked by G. Elias & Brother, 965 Elk Street, Buffalo, for the construction of a gas-producer house, boiler house and coal-storage building at Elk Street and the Buffalo Creek Railroad.

MALONE, N. Y.—Bids will be received by Captain John A. Coffey, secretary of State Board of Armory Commissioners, 158 State Street, Albany, for addition to State Armory, including construction, heating, sanitary and electric work. Plans and specifications may be consulted at the above office, at the New York office of the Department of Architecture, room 1715 Tribune Building, and at the Department of Architecture, Capitol, Albany. Lewis F. Pilcher is state architect.

NEW YORK, N. Y.—The United Electric Light & Power Company, 130 East Fifteenth Street, is planning to erect a new power station, 40 ft. by 50 ft., at 201st Street and Harlem River.

Construction

News of Projects, Plans, Bids and Contracts. Notes on Work Under Way

NEW YORK, N. Y.—Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until Dec. 2 for electric traveling cranes for machine and electric shop at the local navy yard, to cost about $12,000 (Specification 3609).

NIAGARA FALLS, N. Y.—Plans are under consideration by the Electro Metallurgical Company, Union Street, Niagara Falls, for an addition to its plant, to cost about $14,000.

NEWARK, N. J.—Plans are being prepared by the Rubber & Celluloid Products Company, Wilson Avenue, Newark, for rebuilding its plant, recently destroyed by fire, causing a loss of about $100,000. The new building will be 42 ft. by 390 ft., one and two stories high, to cost about $50,000.

SOUTH AMBOY, N. J.—Contract has been awarded by the Raritan River Railroad Company to the Austin Company, 1319 Filbert Street, Philadelphia, Pa., for erection of engine house at its local yards, to cost about $200,000.

WEEHAWKEN, N. J.—The plant of the Independent Lamp & Wire Company, Gregory Avenue, was recently destroyed by fire, causing a loss of about $75,000.

ALTOONA, PA.—The Pennsylvania Railroad Company is planning to enlarge its shops at Altoona and Juniata, for which authorization has been received from the United States Railroad Administration. The plans provide for additional electric and steam power for both the Altoona and Juniata shops, and new equipment to be purchased will include turbines, rotaries, transformers, switches and transmission lines. New stokers will be installed under the present boilers at the Altoona machine shops. An extension, 240 ft., will be built to the Juniata erecting shop, and other changes will be made to increase the output of locomotives. The cost of the work is estimated at $2,000,000.

MARIETTA, PA.—The Pennsylvania Railroad Company is planning to erect a new engine house, machine shop, general shops, power house and other buildings on a site recently acquired in Marietta. The cost is estimated at about $500,000.

PHILADELPHIA, PA.—Permit has been taken out by the Pennsylvania Railroad Company for the construction of an engine house at Forty-ninth Street and Gray Avenue, to cost about $80,000.

PHILADELPHIA, PA.—Extensive improvements including the erection of railroad shops and buildings are under way at the South Philadelphia yards of the Pennsylvania Railroad Company near Greenwich Point. The cost of the buildings with equipment is estimated at $1,000,000.

PITTSBURGH, PA.—Bids, it is reported, are being asked by the Duquesne Light Company for a machine shop, 25 ft. by 100 ft., one-story, to be erected near its electric plant on Brunots Island.

BALTIMORE, MD.—Contract has been awarded by the Baltimore & Ohio Railroad Company for the construction of a repair shop, 90 ft. by 240 ft., one-story, at Gilmore Street, to Frainie Brothers & Haigley, 18 Clay Street, to cost about $175,000. H. A. Lane is chief engineer.

CLAY, W. VA.—A company has been formed by a number of citizens of Clay County for the purpose of distributing electricity purchased from the Hartford (W. Va.) Power Company in Clay Court House, the county seat, for lamps and motors. It is proposed to extend the Elk River transmission line of the Hartland Power 4 miles to the town as well as installing a distribution system here.

HARTLAND, W. VA.—The Hartland Power Company is extending its Elk River transmission line westward. This extension will add three new coal-mining companies to its customers. A further extension of this line has been requested by the Ritenour Coal Company, which has offered to pay the cost of the work.

WEBSTER SPRINGS, W. VA.—The Webster Springs Water & Electric Light Company is planning to install an electric light plant. M. V. Tracy of Webster Springs is engineer.

PORTSMOUTH, VA.—Contract has been awarded by the Emergency Construction Company, Law Building, Suffolk, Va., to the Ulen Contracting Company, 38 Dearborn Street, Chicago, Ill., to increase the capacity of the power house, etc., in connection with improvements to the Portsmouth, Berkley and Suffolk water supply. The total cost of the work is estimated at $2,000,000. The work will be done under the supervision of Captain Moore, R. H. Gordon and H. Q. Kennedy of the United States Army.

RICHMOND, VA.—Orders have been placed by the Virginia Railway & Power Company for a new battery of boilers for its Reeves Street power plant.

RICHMOND, VA.—Arrangements have been made whereby the surplus power generated at the municipal electric plant will be sold to the Virginia Railway & Power Company.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., for furnishing at the various navy yards and naval stations supplies as follows: Mare Island, Philadelphia and Charleston, Schedule 3519—brass, copper and bronze wire. Norfolk and Puget Sound, Schedule 3523—slow and pothead wire. Various yards, Schedule 3526—resistance and fuse wire; Schedule 3527—electrical wire; Schedule 3528—magnet wire. Washington, D. C., Schedule 6984½—15 motor-driven lathes; Schedule 7027½—electric wire and 5000 ft. duplex cable; Schedule 7041½—8000 radio head telephones; Schedule 7053½—400 charging panels and 300 resistance unit spares. Brooklyn, Schedule 7025½—brass and copper wire; Schedule 7121½—75 motor pumps and spares. Eastern yards, Schedule 7026½—6300 flashlights. Norfolk, Schedule 7054½—one motor-generator; Schedule 7108½—Cable and copper wire. Gloucester, Schedule 7059½—two storage batteries. New York, Schedule 7066½—1200 insulators. Quantico, Va., and Miami, Fla., Schedule 7067½—field buzzers, telephone batteries and switchboards. Newport, Schedule 7070½—500 lb. annunciator wire; Schedule 7101½—sheet copper. Pensacola, Schedule 7075½—generator and gasoline engine. South Brooklyn, Schedule 7080½—three 10-kva. transformers. New London and Brooklyn, Schedule 7085½—4000 ft. phosphor-bronze wire. Further information may be obtained on application to the above bureau.

North Central States

DETROIT, MICH.—Contract has been awarded by the Board of Education for construction of power plant on Henry Street, between Second and Third Streets, to Worswick Brothers, Hodges Building.

DETROIT, MICH.—The Capital Issues Committee of the Federal Reserve Board has authorized the city controller to issue $200,000 in bonds for the purchase of property adjoining the municipal electric light plant on Atwater Street. The property will be used for the erection of an addition to the municipal plant and for a high-pressure pumping station for the fire department.

GOODRICH, MICH.—M. A. Jerome is installing an electric lighting plant in Goodrich and would like to receive information on street-lighting equipment for lighting small towns.

GRAND RAPIDS, MICH.—Work has begun on the construction of the new power plant of the Widdicomb Company.

MASON, MICH.—The McLean Construction Company, 176 West Monroe Street, Chicago, Ill., will build two one-story stamp mills, 132 ft. by 150 ft. and 250 ft. by 300 ft., at Mason, to cost about $250,000. J. W. Hoff, 301 Wesley, Oak Park, Ill., is engineer.

OTTER LAKE, MICH.—C. C. Tinker, owner of the local electric light plant, is connecting another town on his transmission system and is installing larger equipment at the local plant. At present steam power is used, but eventually gas-producer engines will be installed to drive the plant. The plant now serves the towns of Otter Lake, Fostoria and Millington with electricity.

CLEVELAND, OHIO.—Work has begun on the erection of additional buildings in connection with the Harvard Avenue plant of the Aluminum Castings Company, including a building, 90 ft. by 120 ft., for melting department; another, 70 ft. by 240 ft., one and two stories, for sand department, and a third, 120 ft. by 280 ft., for finishing and shipping department.

DAYTON, OHIO.—Contract has been awarded by the National Cash Register Company, Main and K Streets, for the erection of a steel warehouse, 150 ft. by 540 ft., to the Ferguson Company, 6523 Euclid Avenue, Cleveland, to cost about $200,000.

NILES, OHIO.—The Engle Aircraft Company has petitioned the City Council to extend the municipal transmission line through East Park Avenue to supply electricity to its plant. The cost of the extension is estimated at $7,000, which will include all the transformers and other equipment at the plant. The Engle company will equip its works for electrical operation as soon as the Council can make arrangements to extend the power line.

PINEVILLE, KY.—Bonds to the amount of $75,000 have been voted to rebuild the Bell County Courthouse, destroyed by fire. Contract, it is understood, will be awarded about the first of the year.

NORTH MANCHESTER, IND.—The Indiana Public Service Commission has granted the Browne Mills Electric Company permission to issue $43,000 in bonds.

PERU, IND.—Work has begun on the foundations for two additions to the local works of the Pittsburgh Model Engine Company, one 40 ft. by 240 ft. and the other 30 ft. by 180 ft., to cost about $100,000.

DU QUOIN, ILL.—The Union Colliery Company of DuQuoin is constructing an all-steel tipple at its mine, 5 miles south of Du Quoin. The mine will be equipped for electrical operation throughout and will have a capacity of from 5000 to 6000 tons per day. The present capacity is about 400 tons daily.

GREENUP, ILL.—Plans are under consideration by the Town Council for rebuilding the municipal electric light plant, recently destroyed by fire.

PITTSFIELD, ILL.—The Board of Supervisors has awarded contract to R. E. Funk of New Canton for the installation of an electric lighting plant at the county farm. The proposed plant will provide for 100 lamps.

DEPERE, WIS.—Contracts have been awarded by the DePere Manufacturing Company for the erection of a new shop, 100 ft. by 100 ft., equipped with a 30-ton electric traveling crane. The company manufactures boilers, etc.

RHINELANDER, WIS.—The Robbins Lumber Company is considering the erection of an addition to its plant to cost about $25,000. New electric generating equipment and woodworking machinery, it is understood, will be purchased.

SHEBOYGAN FALLS, WIS.—The property of the Falls Roller Mills of Sheboygan Falls has been purchased by Captain Ernest Gonzenbach, formerly general manager of the Sheboygan Railway, Power & Light Company. The new owner, it is understood, is planning to enlarge the plant and install additional hydroelectric equipment and supply electricity for commercial purposes.

LITTLE FORK, MINN.—The Littlefork Light & Power Company is changing its system from direct to alternating current. The installation of the street-lighting system has not yet been completed. E. E. Polkinghorne is president and manager.

CHITWOOD, MO.—Pfaeffle & Kelly of Chitwood, is contemplating the purchase of new equipment, including engines, compressors, etc., to cost about $50,000, for their new milling plant.

GALENA, MO.—Plans are under consideration for improvements to the waterworks pumping station, to cost about $100,000. Burns & McDonnell of Kansas City, Mo., are engineers.

HUMANSVILLE, MO.—Plans are under consideration by the Humansville Electric Light Company for the erection of an electric transmission line from Caplinger Mills to Stockton, a distance of 8 miles. L. L. Mathis is secretary.

JEFFERSON CITY, MO.—The Commissioners of Cole County have awarded contract to Louis G. Schell, Moreau Drive, Jefferson City, to rebuild court house, recently damaged by fire. Separate contracts will be let for lighting and heating. The cost of the building is estimated at $150,000.

JOPLIN, MO.—Improvements and extensions are contemplated by the C. H. & M. Mining Company, including the construction of tramway, installation of scales, engine, etc., to cost about $6000.

KANOPOLIS, KAN.—Plans are under consideration for the installation of a motor-driven pump of from 3000 gal. to 5000 gal. capacity at the municipal electric light plant. George M. Beigley is chief engineer.

KANSAS CITY, MO.—At an election held recently the proposal to issue $400,000 in bonds to establish a municipal ice plant in Kansas City was carried.

KANSAS CITY, MO.—Contract for the erection of a pumping station has been awarded by the Kansas City Light & Power Company to Lonsdale Brothers, Bryant Building, Kansas City.

KANSAS CITY, MO.—The Kansas City Light & Power Company is planning to erect a substation on Twelfth Street near Bristol Avenue, to cost from $15,000 to $20,000. Sargent & Lundy, 72 Adams Street, Chicago, Ill., are engineers.

SCHELL, MO.—The Schell City Light Company is erecting an electric transmission line to Harwood, a distance of 6 miles, to furnish electrical service in the latter place. W. M. Wright is proprietor.

SUMNER, MO.—The Sumner Electric Company is erecting an electric transmission line to Forker to furnish electricity there and also to residences along the line. The company is contemplating erecting another line next summer. A. Stobaugh is owner and manager.

WAVERLY, MO.—The Waverly Electric Company is contemplating installing a duplicate generating unit soon for emergency purposes. The present equipment includes a 20-kva., three-phase, 60-cycle, 115-volt Fairbanks-Morse generator and a 25-hp. gas engine. William A. Bartlett is owner and manager.

STERLING, NEB.—Contract has been awarded by the city of Sterling for equipment for electric lighting plant to the Western Electric Company of Omaha, at $10,364. Grant & Fulton, Bankers' Life Building, Lincoln, are engineers.

CLARKSON, NEB.—All bids submitted for rebuilding electric lighting and pumping plants have been rejected by the city of Clarkson. The cost is estimated at $30,000. The Henningson Engineering Company of Omaha is engineer.

OCONTO, NEB.—Dr. J. L. Paine, owner of the local electric light plant, is planning to erect additional transmission lines in the residence section of the town, at a cost of about $500.

BENNINGTON, KAN.—Extensive improvements and extensions are contemplated by B. T. Markley, owner of the local electric light plant, in 1919, including erection of transmission lines to Niles and Verdi and installation of street-lighting systems in both towns and in two other towns. New equipment including a 100-kw. generator and an oil engine will probably be installed during 1919. George C. Markley is general superintendent.

FREDONIA, KAN.—Plans are under way to rebuild the plant of the Empire Electric Manufacturing Company at Fredonia, recently burned, causing a loss of about $75,000. The plant was devoted almost exclusively to the manufacture of Mogul and Empire storage batteries. R. H. Barber is president.

Southern States

ATLANTA, GA.—The Electric Products Company, recently organized, proposes to install electric lighting and power plants on farms in Georgia and Alabama. R. H. Martin, care of Southern Oakland Company, is interested in the company.

ATLANTA, GA.—Improvements are being made to the various substations of the Georgia Railway & Power Company. Work at the Boulevard substation will consist of increasing the capacity of the Lindale line transformer capacity to 6000 kva. This will be accomplished by the installation of two banks of three 1000-kva. transformers each, with a spare transformer for each bank. The transformers are to be connected 110,000 volts delta to 38,000 volts Y, and the two banks will be operated in multiple. Authority has been given for the purchase of spare transformers for the Lindale and Newnan substations.

ROME, GA.—Plans are under consideration by the City Commissioners for the installation of electric generating machinery in the waterworks pumping station to supply electricity for lamps and motors.

ANNISTON, ALA.—The Woodstock Operating Corporation is reported to be in the market for lifting magnets with electric generating equipment.

CLARKSDALE, MISS.—The installation of a 500-hp. water-tube boiler in the municipal electric light and water plants is under consideration by the City Commissioners. W. W. Pointer is superintendent.

COTTER, ARK.—The Dixie Dam & Power Company is planning to construct a hydroelectric power plant on White River. The plans provide for the construction of a dam across the river.

WYNNE, ARK.—Improvements involving an expenditure of about $25,000 are contemplated to the municipal electric light plant.

WESTLAKE, LA.—The Lock Moore Company is contemplating the construction of a sawmill plant, to cost about $200,000. G. Law is secretary.

SULPHUR, OKLA.—Plans are reported to be under consideration for the construction of a new power house at the pumping station.

OKLAHOMA CITY, OKLA.—The Morgan Packing Company is negotiating with the Oklahoma Gas & Electric Company for additional energy, 500 kw., to provide for machinery now being installed in the plant.

BURKBERNETT, TEX.—The Central Power & Service Company is contemplating the construction of a steam power plant to furnish power for the well-drilling outfits in this vicinity. The company will also furnish power for the municipal water supply.

Pacific and Mountain States

SPOKANE, WASH.—Work will soon begin on the installation of the new street-lighting system to be furnished the city by the Washington Water Power Company under contract. The new lamps, which are of the nitrogen-filled type, will replace the old carbon arcs, which have been in use nearly twenty-five years. The new contract is for a period of ten years and calls for 1410 lamps at $52,170 per year.

HOLTVILLE, CAL.—Extensive improvements are contemplated by the Holton Power Company to its local auxiliary plant provided that the company can be assured of 140 second-ft. daily continuous flow from the Imperial Irrigation District. The cost of the proposed work is estimated at between $50,000 and $100,000.

MARE ISLAND, CAL.—Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until Dec. 2 for electric traveling cranes for structural shops, at Mare Island. The cost is estimated at $275,000 (Specification 3240).

PALMDALE, CAL.—The installation of in the Antelope Valley section, to cost new electrically operated pumping plants, about $500,000, is reported to be under consideration by the Palmdale Irrigation District.

SAN FRANCISCO, CAL.—The Public Utilities Committee of the Board of Supervisors has agreed to report in favor of accepting the offer of the Yosemite Power Company to lease what is known as the Gold Rock ditch in the Hetch-Hetchy Valley for $200 per month.

SAN FRANCISCO, CAL.—Arrangements, it is reported, have been completed by the Pacific Gas & Electric Company for the construction of a new substation at Knight's Landing, Yolo County, to cost about $250,000. The company also contemplates the erection of a new electric transmission line through Sycamore to a point near Colusa.

SANTA BARBARA, CAL.—Plans have been prepared by the Board of Education for the erection of a machine shop for the technical and manual training school.

MANVILLE, WYO.—The Town Council has granted J. E. Gallivan, H. G. Twiford, W. W. Austin and others a franchise to construct and operate an electric lighting system in Manville.

Canada

BURRARD INLET, B. C.—The American Nitrogen Products Company is contemplating the erection of a nitrogen plant at Lake Buntzzen, to cost about $300,000.

VANCOUVER, B. C.—The British Columbia Electric Railway Company, it is reported, is considering alterations and some new construction work at its station on Carroll Street.

BRANTFORD, ONT.—A by-law has been introduced in the City Council providing for issuing $100,000 in debentures for extending the tracks of the municipal railway in the Terrace Hill district. The by-law is to be submitted to the ratepayers for approval at the municipal election on Jan. 1.

BROCKVILLE, ONT.—The Canada Carriage Works are reported to be planning to rebuild their plant lately destroyed by fire. The loss is estimated at about $500,000.

ST. CATHARINES, ONT.—The Board of Education is planning to erect a technical school, to cost about $400,000.

TURBINE, ONT.—Contract has been awarded by the International Nickel Company of Copper Cliff for a power development at Trubine, to cost about $2,000,000, to the Fraser Brace Company, 83 Craig Street, West Montreal, Que.

1,281,251. MEASURED-SERVICE TELEPHONE SYSTEM; Roy C. Gifford, Chicago, Ill. App. filed Nov. 14, 1906. Pay station of any calling subscriber is under control of called substation, so that toll is collected or assembled by answering subscriber.

1,281,268. INSULATOR; Arthur O. Austin, Barberton, Ohio. App. filed May 29, 1916. Strain due to unequal expansion and contraction of parts may be relieved without breaking or impairing insulator.

1,281,280. ELECTRIC FURNACE; Jens O. Boving, London, England. App. filed Sept. 4, 1917. Hydraulic and electric power used automatically to regulate supply of electricity.

1,281,285. ELECTRIC FUSE; Leonard B. Buchanan, Woburn, Mass. App. filed Nov. 27, 1914. Indicator showing whether fuse is blown does not come in contact with fuse strip.

1,281,288. METHOD OF CONTROLLING AN ELECTRIC CIRCUIT AND DESIGNATING SAME; Jerome M. Carley, East Greenbush, New York. App. filed March 7, 1918. Only one nut need be released to open circuit.

1,281,309. PROTECTIVE UNIT; William Dubilier, New York, N. Y. App. filed Feb. 9, 1918. Cannot be removed without breaking circuit to be protected.

1,281,338. LOCKING DEVICE; John O. Gargan, Brooklyn, N. Y. App. filed May 13, 1918. Holds movable plates of condenser in fixed position without strain.

1,281,346. MOTOR CONTROLLER; Maurice M. Goldenstein, Milwaukee, Wis. App. filed July 3, 1916. Motor-driven units and their controllers must be coupled before joint operation is possible.

1,281,347. MOTOR CONTROLLER; Maurice M. Goldenstein, Milwaukee, Wis. App. filed Oct. 26, 1916. For automatically stopping motor upon a predetermined variation of speed from a given value.

1,281,348. AUTOMATIC TELEPHONE-EXCHANGE SYSTEM; Charles L. Goodrum, New York, N. Y. App. filed April 26, 1915. Abnormal number of calls in one group of lines taken care of without providing surplus finders.

1,281,372. ELECTRIC-BATTERY DEPOLARIZER; Major E. Holmes, Lakewood, Ohio. App. filed Jan. 7, 1916. Consists of molybdenum trioxide combined with a basic oxide or ammonium phospho molybdate.

1,281,376. PANEL CONSTRUCTION; Albert J. Horton, White Plains, N. Y. App. filed July 14, 1913. Number of panel sections may be varied to meet different requirements, and rheostat of one capacity may be substituted for one of different capacity.

1,281,392. EXPRESSION-CONTROLLING MEANS FOR ELECTRICALLY OPERATED MUSICAL INSTRUCTIONS; John F. Kelly, Pittsfield, Mass. App. filed Nov. 27, 1914. Perforations in music roll of piano control sound volume of notes.

1,281,399. METHOD AND MEANS FOR MEASURING ELECTRICAL ENERGY; Heinrich Landis, Zug, Switzerland. App. filed April 5, 1915. To make charge for energy consumed proportional to apparent units consumed.

1,281,402. METHOD FOR UNITING RAILWAY RAILS; John C. Lincoln, Cleveland, Ohio. App. filed Feb. 6, 1914. Edges of fishplates upon both sides of rail ends directly welded to heads and flanges.

1,281,409. ELECTRIC BATTERY; Edward L. Marshall, Fremont, Ohio. App. filed Feb. 18, 1915. Paste is applied to lining of dry cell in uncooked condition, to insure uniform contact and consumption of zinc.

1,281,421. PROCESS OF MANUFACTURING DRY CELLS; Lloyd R. Rhoades, Fremont, Ohio. App. filed Feb. 21, 1918. Paste is sprayed on bibulous lining.

1,281,422. ELECTRIC SIGNAL; Herbert J. Sanderson, Pittsburgh, Pa. App. filed Oct. 8, 1917. Two lamps in front of automobile and two in the back may be operated in pairs or independently.

1,281,454. ELECTRIC WELDING; Alexander P. White, Caldwell, N. J. App. filed March 15, 1917. Current for joining sheets together is applied in circular path.

1,281,459. TELEPHONE-EXCHANGE SYSTEM; Ray S. Wilbur, Lyndhurst, N. J. App. filed March 8, 1918. Signaling means for central energy-type systems.

1,281,482. ELECTRIC CIRCUIT PROTECTOR; Sydney N. Baruch, Oakland, Cal. App. filed June 15, 1914. To eliminate possibility of motor or other electrical apparatus burning up from either an overload or because current after being cut off line comes back on again when motor is at standstill.

Record of Electrical Patents

Notes on United States Patents

1,281,515. RAILWAY BLOCK-SIGNAL SYSTEM; Winthrop M. Chapman, Needham, Mass. App. filed Feb. 26, 1913. To enable a car in backing out of entering end of a block to count off a car and to permit a car to enter a block against danger signal and then back off block without interfering with operation of signals.

1,281,517. SPLICE FOR CONDUCTORS; Lewis W. Chubb, Edgewood Park, Pa. App. filed Jan. 5, 1915. Means for making a splice or a clamp between two connections that could not be effectively and economically clamped or soldered for electrical use.

1,281,518. SHIELDING SYSTEM FOR VAPOR CONVERTERS; Lewis W. Chubb, Edgewood, Park, Pa. App. filed Oct. 7, 1915. Power arc may be directed and controlled and short-circuiting, reverse arcing and other harmful phenomena minimized.

1,281,521. FURNACE; Edgar F. Collins, Schenectady, N. Y. App. filed Nov. 10, 1917. Particularly suitable for heating objects of great dimensions such as large-caliber guns, turbine and engine shafts.

1,281,524. DIRECTION SIGNAL FOR AUTOMOBILES; Harry G. Craft, Clarksdale, Miss. App. filed May 2, 1917. Illuminated semaphore arms can be raised on each side of car.

1,281,527. ARC LAMP; William A. Darrah, Wilkinsburg, Pa. App. filed Oct. 3, 1913. Internal circulating system precludes accumulation of deposits upon inner surface of arc-inclosing globe.

1,281,533. SWITCH LOCK; David J. Dolan, Detroit, Mich. App. filed March 7, 1918. When in neutral position switch establishes circuit which intercepts and grounds any current going through system.

1,281,550. DEVICE FOR AIDING THE HEARING; Morris Friedman, Brooklyn, N. Y. App. filed March 31, 1916. Microphonic transmitter amplifies sound waves.

1,281,553. MULTIPLE BLOW-OUT FUSE; Henry J. Gagnon, Cohoes, N. Y. App. filed Nov. 22, 1917. Contains means for indicating when fuse has been blown.

1,281,561. RAIL BOND; William D. Hamer, Indianapolis, Ind. App. filed Aug. 9, 1915. Rail bond is forced into hole having larger diameter at bottom than at top.

1,281,564. SWELL-REGULATING MECHANISM FOR ORGANS; William E. Haskell, Brattleboro, Vt. App. filed Feb. 7, 1917. Special perforations in note roll of automatically operated organ actuate swell shades.

1,281,593. TELEPHONE SET; Charles H. Lehman, New York, N. Y. App. filed Aug. 21, 1917. Transmitter and receiver are protected by the casing and form a seal for each other when box is closed.

1,281,604. METHOD AND APPARATUS FOR CARRYING OUT CHEMICAL REACTIONS BY MEANS OF MAGNETICALLY-SPREAD-OUT ELECTRIC ARCS; Anton V. Lipinski, Zurich, Switzerland. App. filed March 6, 1918. Provides for continuous operation.

1,281,611. TELEPHONE SYSTEM; Eric R. Lundius, Brooklyn, N. Y. App. filed Dec. 26, 1917. False operation of ring-up relay overcome.

1,281,636. METHOD OF ELECTRIC WELDING; Thomas E. Murray, Jr., Brooklyn, N. Y. App. filed Feb. 6, 1918. Being briefly subjected to an abnormally high ampere current causes weld to be of equal strength with rest of material.

1,281,637. METHOD OF ELECTRIC WELDING; Thomas E. Murray, Jr., Brooklyn, N. Y. App. filed Feb. 6, 1918. When joining two contact areas where length is greater than width higher ampere strength current is necessary than if length and width were equal.

1,281,658. LIQUID GAGE; Frank I. Remy and Benjamin P. Remy, Indianapolis, and Arthur Berger, Anderson, Ind. App. filed Jan. 10, 1916. Indicator may be located at some distance from the tank for mounting in an automobile.

1,281,673. METHOD AND APPARATUS FOR PRODUCING HIGH-TENSION UNIDIRECTIONAL DISCHARGE; James E. Seeley, Los Angeles, Cal. App. filed Oct. 15, 1918. Impulses are substantially free from low-tension current.

1,281,678. ELECTRICAL INSULATOR; Alexander B. Simpson, Jersey City, N. J. App. filed April 21, 1914. Hollow tube contains joints of connected wires.

1,281,684. ELECTRIC SIGNALING; George O. Squier, United States Army, and Louis W. Austin and Louis Cohen, Washington, D. C. App. filed Aug. 14, 1916. Messages are transmitted of different frequency from that used in duplex system.

1,281,698. JOINT FOR LIGHTING FIXTURES; Morris E. Surfacem, Decatur, Ill. App. filed Jan. 31, 1916. Detent concealed from view prevents complete rotation of fixture.

1,281,716. PROCESS FOR MAKING MOLDED CONDUCTORS; Samuel Trood, Wilkinsburg, Pa. App. filed Oct. 3, 1916. Brush for collecting current on dynamo consists of metal and graphite, soapstone or other lubricating materials.

1,281,730. SYSTEM OF CONTROL; Charles C. Whittaker, Wilkinsburg, Pa. App. filed Aug. 7, 1916. Relates to induction motors which are governed by means of liquid rheostats or the like.

1,281,742. WIRELESS TELEGRAPHY AND TELEPHONY; Prof. Dr. Hendrik Zwaardemaker, Utrecht, Netherlands. App. filed July 23, 1918. Sensitiveness of the thermic telephone, serving simultaneously as detector, considerably increased by working with polarization.

1,281,743. ARC LAMP; Christian Aalborg, Wilkinsburg, Pa. App. filed March 20, 1913. Electrodes fed and regulated to permit decreasing length of lamp.

1,281,744. ELECTRIC HEATING UNIT AND METHOD OF MAKING THF SAME; Charles C. Abbott, Pittsfield, Mass. App. filed March 29, 1918. Sheathed wire is embedded in the surface of a metallic member preferably by forging the two into intimate thermal relation.

1,281,745. ARC LAMP; F. Alexander, New York, N. Y. App. filed Dec. 10, 1914. One automatic feeding mechanism regulates two or more arcs in series.

1,281,750. LOCKING DEVICE FOR IMPULSE STARTERS; Frederick W. Andrew, Brooklyn, N. Y. App. filed June 29, 1918. When actuating spring is rendered inoperative driving and driver parts of starter are locked together.

1,281,767. TELEPHONE-RECEIVER HOLDER; Charles F. Corgan, Portland, Ore. App. filed April 24, 1918. Swinging receiver and holder into position for use releases switch lever.

1,281,796. ARC-LAMP ELECTRODE; Isador Ladoff, Wilkinsburg, Pa. App. filed June 20, 1914. For producing a relatively steady arc and comprising arcing material mixed with a compound of uranium.

1,281,811. TESTING SYSTEM; Louis A. Mortimer, New York, N. Y. App. filed March 8, 1918. Employed in testing apparatus of telephone systems.

1,281,326. ELECTRIC SWITCHING DEVICE; Erich Philippi, Berlin, Germany. App. filed Feb. 26, 1914. For a number of conductors, transformers or other electrical apparatus, which are to be connected in circuit or disconnected from circuit through a protecting resistance.

1,281,827. ENGINE STARTING AND LIGHTING SYSTEM; Leo. A. Phillips, Milwaukee, Wis. App. filed Aug. 5, 1914. Controlling devices are provided for insuring charging the battery at predetermined rate.

1,281,849. STRAIN INSULATOR; William Schaake, Pittsburgh, Pa. App. filed Jan. 14, 1918. Substantially requires no machine work, and practically all of the elements may be assembled by hand.

1,281,857. PROCESS FOR RECOVERY OF BATTERY FLUIDS; Samuel H. Sheib, Richmond, Va. App. filed Nov. 30, 1917. To save caustic soda and zinc by-product and rejuvenate used alkaline electrolyte.

1,281,862. CURRENT-COLLECTING DEVICE; Robert Siegfried and Herbert G. Jungk, Pittsburgh, Pa. App. filed Oct. 13, 1917. Relates to the collector rings of alternating-current motors.

1,281,863. RECTIFIER SYTEM; Karl A. Simmon, Wilkinsburg, Pa. App. filed April 25, 1914. Voltage strains in power for railways are symmetrically distributed.

1,281,872. INCLOSED SWITCH; Alexander K. Sutherland, New Britain, Conn. App. filed Nov. 5, 1917. To prevent unauthorized tampering and to necessitate opening of switch before switch casing can be opened.